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FM 6-130

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WAR DEPARTMENT

**FIELD ARTILLERY
FIELD MANUAL**

REFERENCE DATA

UNIVERSITY OF CALIFORNIA
AT LOS ANGELES

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**FIELD ARTILLERY
FIELD MANUAL**



REFERENCE DATA

**Prepared under direction of the
Chief of Field Artillery**



**UNITED STATES
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WASHINGTON, *October 1, 1940.*

FM 6-130, Field Artillery Field Manual, Reference Data, is
published for the information and guidance of all concerned.

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BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

E. S. ADAMS,
Major General,
The Adjutant General.

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FIELD ARTILLERY FIELD MANUAL

REFERENCE DATA

SECTION I

GENERAL

■ 1. **SCOPE.**—This manual contains reference data of special value to field artillery personnel in the theater of operations, or references to authorized training literature containing these data.

■ 2. **TRAINING PUBLICATIONS.**—The current list of Field Manuals, Technical Manuals, and other training matter is published in FM 21-6. Field Service Regulations, Staff Officers' Field Manual, and the Basic Field Manuals are applicable, in general, to all arms and services. Where appropriate, they should be used to supplement this manual.

■ 3. **REFERENCES.**—*a.* The description, care, use, preservation, maintenance, and adjustment of weapons and sights, and fire-control instruments and ammunition pertaining thereto, are given in appropriate Technical Manuals and Standard Nomenclature Lists.

b. Other subjects of special application to field artillery training and the War Department publications relative thereto are as follows:

(1) Regulations for automatic rifle, including antiaircraft marksmanship, and pistol instruction: Appropriate Basic Field Manuals.

(2) Ordnance cleaning and preserving materials and tools: TM 9-850 (now published as TR 1395-A).

(3) Military courtesy and discipline; military sanitation and first aid; personal equipment and clothing, including assembling, packing, and disposition for the field; physical training, and defense against chemical attack: Appropriate

Basic Field Manuals.

(4) Information on weapons and ammunition vehicles in the various organizations, and characteristics of chemical munitions: FM 101-5 and FM 101-10 (now published as part two, SOFM).

■ 4. CHARACTERISTICS OF FIELD ARTILLERY WEAPONS.

TABLE I

Caliber and type	Ammunition						Traverse permitted by carriage (mils)	Rates of fire (rounds per minute)		
	Kind	Approximate weight (pounds)		Burst effect (yards)		Unit of fire		Ex- treme range (yards) ²	Prolonged	Short bursts
		Fuzed projectile	Complete round	Complete round packed	Range					
2.95-inch mountain gun	Shrapnel (fixed) Shell; HE (fixed)	16 12	18 15	22 100 19 5 30	300	{ 4, 400 4, 500	None	3		
75-mm pack howitzer, M1	Shell, HE with PD fuze, M48 (semifixed). Shell, HE with time-and superquick fuze, M54 (semifixed).	14.6	18	22 5 30	300					{ 9, 700 1 7, 400
75-mm field howitzer. M3A1.	Same as M1 howitzer						800 (45°)	3	6	

¹ Limit of time element of time-and-superquick fuze, M54.² Maximum effective range is approximately 85 percent of extreme range.

TABLE I—Continued

Caliber and type	Kind	Ammunition						Ex- treme range (yards) ²	Traverse per- mitted by car- riage (mils)	Prolonged	Short bursts	Rates of fire (rounds per min- ute)			
		Approximate weight (pounds)		Complete round	Burst effect (yards)		Unit of fire								
		Fuzed projectile	Complete round		Range	Lateral									
75-mm gun, horse-drawn, M1897A4.	{Shell, HE, M48 with PD fuze, M48 (fixed). Shell, HE, M48 with time- and-superquick fuze M54 (fixed).	14.6	19	23	5	30	{13,600 19,000 300	105 (6°)	3	6					
		14.6	19	23	5	30									
	{Shell, HE, Mk. I (fixed). Shell, Cml, Mk. II (fixed).	12.5	16.5	23	5	30	{8,900 8,800								
		12.5	16.6	23											

75-mm guns, truck-drawn: M1897A4..... M1916A1 and M1916- M1A1 (American modified). M1917A1 (British modified). M2A1, M2A2 M2A3.	Same as for 75-mm gun, hor-e-drawn										3		6	
											{ 105 (6°) 800 (45°) }			
											{ 142 (8°) }			
											{ 1,511 (85°) 1,067 (40°) }			
105-mm howitzer, M1	{ Shell, M1 with PD fuze, M48 (semifixed). Shell, M1 with time-and- superquick fuze, M54 (semifixed) }	{ 32.7 }	42	50	{ 9 40 200 }	{ 12, 100 18,700 }	2	4						
155-mm howitzer, M1918A1	{ Shell, HE, M102 (separate- loading). Shell, HE, Mk. I A1 (sepa- rate-loading). Shell, HE, Mk. I (separate- loading). Shell, Cml, Mk. II (sepa- rate-loading). }	{ 94.3 95.4 95.4 95 }	100	{ 105 9 70 150 }	{ 9 70 9 70 9 70 150 18,600 }	{ 12,800 12,400 12,400 18,600 }	1	3						

TABLE I—Continued

Caliber and type	Ammunition							Ex- treme range (yards) ²	Traverse per- mitted by car- riage (mils)	Rates of fire (rounds per min- ute)	
	Kind	Approximate weight (pounds)			Burst effect (yards)		Unit of fire			Prolonged	Short bursts
		Fuzed projectile	Complete round	Complete round packed	Range	Lateral					
155-mm guns, M1	Shell, HE, M101 (separate-loading).	94.7	128	148	9	70	100	25,400	1,065 (60°)	1	3
	Shell, HE, M101 (separate-loading).	94.7	120	134	9	70	100	20,000	1,065 (60°)	1	3
	Shell, HE, Mk. III A1 (separate-loading).	97.4	122	135	9	70		20,000			
	Shell, HE, Mk. III (separate-loading).	97.4	122	135	9	70		17,400			
	Shell, Cml. Mk. VII (separate-loading).	97.8	123	136				17,400			
8-inch howitzer M1	Shell, HE, M1	200		243			80	18,700	1,065 (60°)	1/4	1

240-mm howitzer, M1918.	Shell. HE, Mk. III (sepa- rate-loading).	345	383	430	60	16,400	355 (20°)	1/4	1/2
-------------------------	---	-----	-----	-----	----	--------	-----------	-----	-----

Maximum effective range is approximately 85 percent of extreme range.

TABLE II

Caliber and type	Time to emplace	Approximate total weights (gun, carriage, and filled limber, if any) 1	Transport				Marches		Remarks
			Piece		Ammunition		Average rate (m. p. h.) 2	Average day's march	
			Method	Number of loads	Method	Rounds per vehicles 3			
2.95-inch mountain gun.	3 minutes	830	Pack	4	Pack	10	3½	20	
75-mm pack how- itzer, M1.	3 minutes	1,300	Pack	36	Pack	9	3½	20	
75-mm field how- itzer, M3A1.	3 minutes	3,340	6-horse team	1	Caisson, light, M1 Limber, light, M2 Trailer, 1-ton, 2-wheel Truck, 7 2½-ton, 6 x 6	52 22 91 177	5½ 5½ 23 23	30 30 160 160	
75-mm field how- itzer, M3A1 (ar- mored division artillery).	3 minutes	2,100	Truck, half- track, ar- mored.	1	Trailer, 1-ton Truck, half-track, ar- mored. Truck, 2½-ton, 6 x 6	91 75 177			

75-mm gun, horse-drawn: M1897A4.....	3 minutes...	4, 600	6-horse team...	1	{Caisson, M1918..... Limber, M1918, gun..... Limber, M1918, caisson. Truck, ⁷ 2½-ton, 6 x 6... Trailer, 1-ton.....	70 35 37 170 87	4 4 4 23 23	25 25 25 160 160
75-mm guns, truck-drawn: M1897A4 M1916A1 (American, modified). M1917A1 (British, modified). M2A1, M2A2, and M2A3.	3 minutes...	{3,000 3,350 3,200 3,800}	{Truck, ⁷ 2½-ton, 6 x 6. 1		{Trailer, 1-ton..... Truck, ⁷ 2½-ton, 6 x 6.....	87 170	23 23	160 160

¹ Weights do not include personnel. Add 200 pounds per man where appropriate.

² Weights will vary, depending on types of ammunition carried. Weight given is for HE shell.

³ Maximum load, 248 pounds.

⁴ Rates of march apply to travel on primary roads. For secondary roads or hilly primary roads, reduce rate 20 percent. For motor transportation across country, 1½-ton and 2½-ton trucks, rate is 5 to 8 m. p. h.; 4-ton or larger trucks, 4 to 6 m. p. h.

⁵ Figures are for resupply loads; vehicles empty except driver and one other man (200 pounds each), and 200 pounds of vehicle tools and accessories for 1½- and 2½-ton trucks, and 660 pounds for 4-ton trucks.

⁷ Until 2½-ton trucks are issued, 1½-ton 4 x 4 or other trucks on hand will be used.

TABLE II—Continued

Caliber and type	Time to emplace	Approximate total weights (gun, carriage, and filled limber, if any)	Transport				Marches		Remarks
			Piece		Ammunition	Rounds per vehicles	Average rate (m. p. h.)	Average day's march	
			Method	Number of loads					
105-mm howitzer, M2.	3 minutes	4,300	Truck, 7 2½-ton, 6 x 6.	1	Trailer, 1-ton. Truck, 7 2½-ton, 6 x 6.	40 78	23 23	160 160	Ammunition now issued is boxed, 2 rounds each. Figures given are based on estimated weight of standard bundles.
155-mm howitzer, M1918A1.	5 minutes	9,000	Truck, 4-ton, 6 x 6.	1	Trailer, 1-ton. Truck, 7 2½-ton, 6 x 6. Truck, 4-ton, 6 x 6.	19 37 66	23 23 20	160 160 140	
155-mm guns, tractor-drawn: M1. M1918A1 (GPF, modified).	½ to 1 hour. 1 to 6 hours	30,740 29,530	Tractor, heavy	1	Trailer, 1-ton. Truck, 7 2½-ton, 6 x 6.	14 26	23 23 6	160 160 40	

8-inch howitzer, M1.	½ to 1 hour	31,740	Tractor, heavy	1	Trailer, 1-ton Truck, ⁷ 2½-ton, 6 x 6	8 16 6	23 23 6	160 160 40
240-mm howitzer, M1918.	3 to 12 hours	58,640	Tractor, heavy	4 ⁴	Trailer, 1-ton Truck, ⁷ 2½-ton, 6 x 6	4 9	23 23 6	160 160 40

¹ Weights do not include personnel. Add 200 pounds per man where appropriate.

² Weights will vary, depending on types of ammunition carried. Weight given is for IIE shell.

⁴ Maximum load, 16,230 pounds.

⁵ Rates of march apply to travel on primary roads. For secondary roads or hilly primary roads, reduce rate 20 percent. For motor transportation across country, 1½-ton and 2½-ton trucks, rate is 5 to 8 m. p. h.; 4-ton or larger trucks, 4 to 6 m. p. h.

⁶ Figures are for resupply loads; vehicles empty except driver and one other man (200 pounds each), and 200 pounds of vehicle tools and accessories for 1½- and 2½-ton trucks, and 660 pounds for 4-ton trucks.

⁷ Until 2½-ton trucks are issued, 1½-ton 4 x 4 or other trucks on hand will be used.

■ 5. DUTIES OF INDIVIDUALS IN FIELD ARTILLERY DETAILS.—The table below gives the principal tactical duties of individuals of field artillery details. This table is furnished as a guide only. The duties listed are not invariable or rigid, and should be adopted to the situation and personnel available.

TABLE III

Individual	Brigade or Division Artillery Headquarters	Regiment	Battalion	Battery
Sergeant major	In charge of enlisted personnel at CP; control of traffic at CP; supervision of message center.	Same as brigade	Same as brigade	
Headquarters clerk(s)	Clerk for CO and Ex.; typist; keeps unit journal.	Same as brigade	Same as brigade	
Message center chief	In charge of message center; code clerk; dispatcher.	Same as brigade	Same as brigade	
Message center clerk	Assist message center chief.	Same as brigade	Same as brigade	

Operations sergeant.....	Assistant to S-2 and S-3; draftsman; keeps situation map.	Same as brigade.....	Same as brigade; keeps record of ammunition expenditure.	
Operations corporal.....	Draftsman; keeps S-3 records.	Same as brigade.....	Same as brigade.....	
Operations clerk.....	Clerk for S-3; typist.....			
Ammunition sergeant.....	Assistant to munitions officer.			
1st sergeant.....	In charge of rear echelon of headquarters battery.	Same as brigade.....	Same as brigade.....	In charge of limbers and rear echelon.
Agent corporal.....		Messenger; marches with party of next higher echelon.	Same as regiment.....	Same as regiment.
Meteorological technical sergeant.	In charge of meteorological section; observer.			
Meteorological sergeant..	Plotter.....			
Meteorological specialists	Assistant plotter; reader.			

TABLE III—Continued

Individual	Brigade or Division Artillery Headquarters	Regiment	Battalion	Battery
Communication chief.....	Assistant to communication officer; supervises installation, operation, and maintenance of all means of communication.	Same as brigade.....	Same as brigade.....	
Signal sergeant.....	Assistant to communication officer; in charge of wire communication; care and maintenance of wire equipment.	Same as brigade.....	Same as brigade.....	Establishment and maintenance of communication; care and maintenance of signal equipment.
Signal corporal No. 1.....	In charge of wire truck (reel) 1; installation, operation, and maintenance of wire circuits; in charge of line-man at telephone central.	Same as brigade.....	Same as brigade.....	Same as brigade.

Signal corporal No. 2.....	In charge of wire truck (reel) 2; same duties as signal corporal 1.	Same as brigade.....	Same as brigade.....	Same as brigade.
Signal corporal No. 3.....	Installation, operation, and maintenance of wire circuits; same duties as signal corporal 1.			
Linemen Nos. 1 and 3....	Linemen with wire truck (reel) 1.	Same as brigade.....	Same as brigade.....	Same as brigade.
Linemen Nos. 2 and 4....	Linemen with wire truck (reel) 2.			
Linemen, higher Nos....	Installation, operation, and maintenance of wire circuits.		Same as brigade.....	
Switchboard operators	Installation and operation of switchboard.	Same as brigade.....	Same as brigade.....	Same as brigade.
Telephone operator No. 1.	Telephone operator for CO and Ex.; installation of local circuits at CP.	Same as brigade.....	Telephone operator at OP; visual signalman at OP.	Same as battalion.

TABLE III—Continued

Individual	Brigade or Division Artillery Headquarters	Regiment	Battalion	Battery
Telephone operator No. 2.	Telephone operator at CP; installation of local circuits at CP.	Same as brigade	Telephone operator at FD center; installation of local circuits to FD center.	Telephone operator at gun position.
Telephone operator No. 3.	Telephone operator at CP; installation of local circuits at CP.	Same as brigade	Telephone operator at FD center; installation of local circuits to FD center.	Telephone operator at OP; lineman.
Telephone operator No. 4	Installation of telegraph legs; relief telephone operator; lineman.	Same as brigade	Telephone operator at FD center; installation of local circuits to FD center.	Telephone operator at gun position; lineman.
Telephone operators Nos. 5 and 6.	Relief telephone operators and linemen.		Telephone operators with liaison sections Nos. 1 and 2 respectively.	
Messengers	Provide messenger service.	Same as brigade	Same as brigade	

Radio sergeant. -----	Assistant to communication officer; in charge of radio communication, care and maintenance of radio equipment.	Same as brigade -----	Same as brigade -----	
Radio operators Nos. 1 and 2.	Operate radio set in brigade net; telegraph operators.	Operate radio set in regimental net; telegraph operators.	Operate radiotelegraph or radiotelephone sets as directed.	Operate radiotelephone sets.
Radio operators Nos. 3 and 4.	Operate radio set in division net.	Operate radio set in brigade net; telegraph operators.	Operate radio set in regimental net; telegraph operators.	(No. 3) operates radiotelephone set.
Radio operators Nos. 5 and 6.	Operate radio set in air-ground net; telegraph operators.	Same as brigade -----	Same as brigade -----	Note: The 4 operators of AA-AT battery, medium artillery, operate sets in the AA-AT net.
Radio operators Nos. 7 and 8.	Operate radio set in AA-AT net.		Same as brigade -----	
Radio operators Nos. 9 to 12			Operate radiotelephone sets.	

TABLE III—Continued

Individual	Brigade or Division Artillery Headquarters	Regiment	Battalion	Battery
Instrument sergeant.....	Assistant to RO in survey operations; draftsman; care of instruments.	Assistant to RO; care of instruments; prepares visibility and dead-space charts.	Same as brigade; organization of OP.	In charge of battery detail; assistant to RO in survey operations; organization of OP; preparation and conduct of fire; prepares visibility and dead-space charts; visual signalman at OP; care of instruments.
Instrument corporal.....	Assists instrument sergeant.	Same as brigade.....	Same as brigade	Same as brigade.
Instrument operator.....		Assists instrument sergeant.	Same as regiment.	Same as regiment; delivers, sets up, and operates aiming circle at post of executive; member of visual team at post of executive.
Survey sergeant.....	Assistant to instrument sergeant in survey operations; prepares visibility and dead-space charts; draftsman.		Same as brigade.	

Survey corporal.....	Survey; draftsman.....	Same as brigade.....	
Survey operators.....	Assist survey sergeant.....	Same as brigade.....	
Scout sergeants Nos. 1 and 2.		Assistants to LNO Nos. 1 and 2 respectively; in charge of liaison section; preparation and observation of fire; reconnaissance.	
Scout corporal No. 1.....		Assists scout sergeant No. 1; visual signalman; relief radio operator; messenger.	Guides firing battery to position; visual signalman at OP; relief telephone operator at OP; instrument operator at OP; messenger.
Scout corporal No. 2.....		Assists scout sergeant No. 2; same duties as scout corporal No. 1.	Assists RO; gun marker; visual signalman at gun position; relief telephone operator; messenger.
Scouts Nos. 1 and 2.....		Assist scout sergeants Nos. 1 and 2 respectively; visual signalmen; messengers.	
Bugler and messenger.....	Messenger.....	Same as brigade.....	Same as brigade.

SECTION II

AMMUNITION

■ 6. PAINTING AND MARKINGS.—*a. Painting projectiles.*—The color of the paint indicates the classification of the explosive material with which the projectile is loaded. The following color scheme is used for painting artillery projectiles:

(1) *Yellow.*—High explosive.

(2) *Red.*—Low explosive such as black powder or shrapnel.

(3) *Gray.*—Chemical. In addition to the solid color, chemical ammunition has certain markings to indicate the particular type of chemical. A single green band indicates a nonpersistent gas, and two green bands indicate a persistent gas. A single yellow band denotes a smoke filler.

(4) *Black.*—Dummy and target practice projectiles.

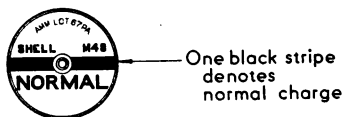
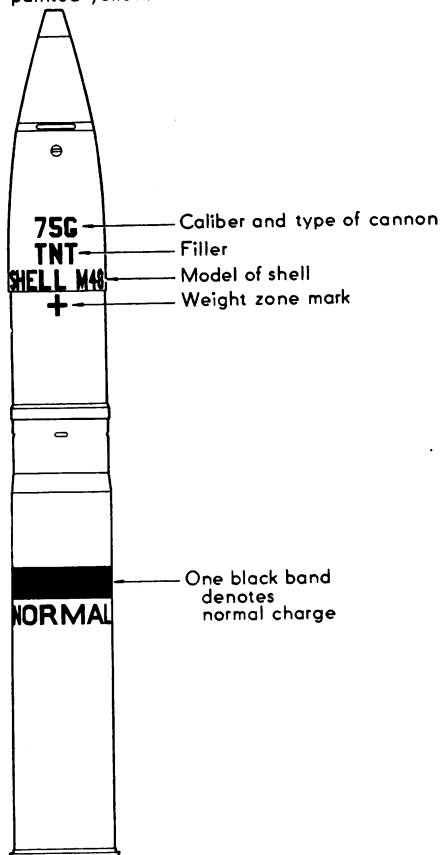
(5) *Blue.*—Practice ammunition (very small charge of low explosive).

(6) *White.*—Illuminating.

b. Marking ammunition.—In addition to the color markings described in *a* above, each component of the complete round is marked to further identify it. To identify completely an ammunition lot, it is necessary to state in full the kind of ammunition followed by the ammunition lot number and manufacturer's name. With fixed or semifixed ammunition, the ammunition lot is stamped on the base of the cartridge case. Figure 1 shows the typical markings found on complete rounds of fixed and semifixed high-explosive ammunition. Figure 2 shows the typical markings found on chemical shell.

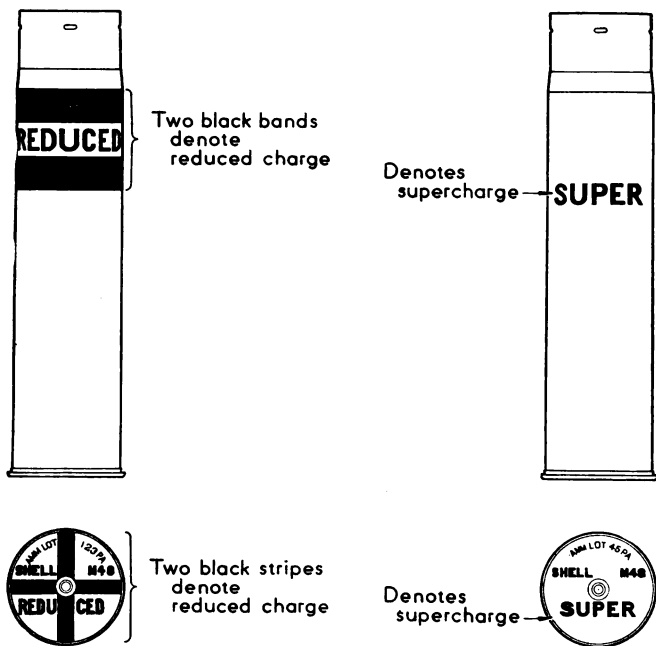
c. Marking containers.—The metal or fiber containers used for packing fixed and semifixed ammunition are marked to indicate the ammunition lot number. The metal cans have two 1-inch bands of paint around the middle, and the fiber containers have colored adhesive tape at the closure to indicate the type of projectiles they contain, the color being the same as that of the projectile. There is affixed to or packed within the packing case or bundle a data card which gives all necessary information for proper and complete identification of the item or component.

HE SHELL
(Body painted yellow)



① Fixed.

FIGURE 1.—Marking for high-explosive shell.



②. Semifixed.

FIGURE 1.—Marking for high-explosive shell—Continued.

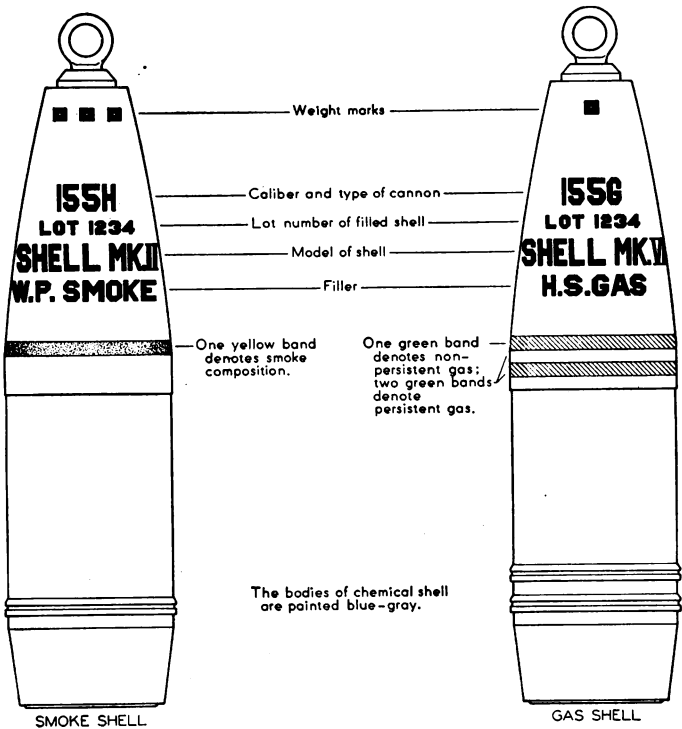


FIGURE 2.—Marking for chemical shell.

■ 7. GUIDE FOR ESTIMATING PROBABLE EXPENDITURES.

TABLE IV.—Rounds per gun per hour

Kind of fire; phase of action	Rounds per gun per hour				
	75-mm gun or howitzer	105-mm howitzer	155-mm howitzer	155-mm gun	240-mm howitzer
1. Advance-guard action, development, and deployment.....	50	50	25	-----	-----
2. Preparation.....	170	120	50	50	10
3. Supporting fires during the attack (observed fires only).....	65	50	25	25	10
4. Supporting fires during the attack (schedule and observed fires):					
First 2 hours.....	140	100	50	50	10
After 2 hours.....	80	60	30	30	10
5. Pursuit, exploitation, delaying action, delaying enemy deployment.....	50	50	25	25	10
6. Counterpreparation.....	170	120	50	50	10
7. Defensive fires against infantry attack.....	140	100	50	50	10

NOTE.—These figures are suitable for short periods of time (2 to 6 hours) for guns actually firing. Estimates should not exceed amounts given in table V.

TABLE V.—Units of fire

Kind of fire; phase of action	Units of fire				
	75-mm gun or howitzer	105-mm howitzer	155-mm howitzer	155-mm gun	240-mm howitzer
1. Attack and defense in a meeting engagement (including covering and security forces).....	1.5	1.5	1.5	1.0	-----
2. Attack and defense of a position (observed fires only).....	1.5	1.5	1.5	1.5	1.5
3. Attack and defense of a position (schedule and observed fires):					
First day.....	2.0	2.0	2.0	1.5	1.5
Succeeding days.....	1.0	1.0	1.0	1.0	.5
4. Pursuit, exploitation, retirement, and delaying action.....	1.0	1.0	1.0	.5	.5
5. Periods of stabilized defense.....	.2	.2	.2	.2	.2
6. Covering and security forces.....	1.0	1.0	.5	-----	-----

NOTES

1. Expenditures for preparations and counterpreparations are not included. (See table IV.)

2. Actual ammunition requirements in the several types of combat enumerated above will vary with each particular situation. Data are based upon such statistics and studies as are available and serve merely as a guide.

SECTION III

**CHECK LISTS FOR FIELD ARTILLERY FIELD ORDERS
AND RECOMMENDATIONS FOR EMPLOYMENT OF
ARTILLERY AND FIELD ARTILLERY ANNEXES**

■ **8. GENERAL.**—For general information on orders and annexes, as well as for the technique of preparation of a field order, see FM 101-5. In the paragraphs below are given check lists and forms which may be used as reminders in the preparation of field artillery field orders, recommendations, and annexes. It is not to be inferred that all items listed must be included necessarily, nor that other items are unnecessary. A trained commander or staff officer prepares an order to fit the situation, not a form.

■ **9. CHECK LISTS.**

Check list—for a
FIELD ARTILLERY FIELD ORDER

1. *a.* Information of the enemy—general information necessary to give subordinates a clear picture of the enemy's situation; also, if available, specific information of known or probable targets for the subordinate units.
- b.* Information of friendly troops affecting employment of artillery of the unit issuing the order.
 - (1) Mission and scheme of employment of command to which the artillery pertains.
 - (2) Zones of action or defensive sectors of units to be supported.
 - (3) Information of neighboring, supported, or supporting artillery.
 - (4) Information of other units or agencies of value to the artillery.
 - (5) Topographical and geodetic information not shown on reference maps.

2. Mission of the artillery, including area or priority of areas in which it will be prepared to mass the bulk of its fire; preparation (general counterpreparation).
3. *a.* Designation of unit or groupment. (Give a separate lettered subparagraph for each.)
 - (1) Missions—missions in direct or general support, zones or limits within which fire must be delivered, special fire missions.
 - (2) Positions (areas). Time of occupation.
 - (3) Routes and order of march (when applicable).*x.* Tactical instructions applicable to two or more units, as appropriate.
 - (1) Minimum range line.
 - (2) Firing chart to be used.
 - (3) Base, check, reference, registration points.
 - (4) Registration—times, coordination, type of fire, observation, reports to be made, restrictions.
 - (5) Survey—orientation.
 - (6) Organization of positions.
 - (7) Circulation and reconnaissance (including restrictions for secrecy).
 - (8) Schedule fires.
 - (9) Ammunition.
 - (10) Rates of fire.
 - (11) Liaison including check concentrations.
 - (12) Air observation.
 - (13) Changes of position—time, routes, etc. (Negative information of value to subordinate units.)
 - (14) Meteorological messages.
 - (15) Accompanying artillery.
 - (16) Antitank guns. (Other items may be added as necessary.)
4. *a.* Instructions concerning supply, evacuation, traffic, trains, personnel, etc., which are not covered by administrative order.
b. Reference to appropriate administrative order by number.

5. *a.* Plan of signal communication (refer to annex or to signal operation instructions if issued). Orders relative to use of signal communication when of sufficient importance to the entire command, disposition of available radios, and allotment of frequency channels;
- b.* Axes of signal communication:
 - (1) Unit issuing order.
 - (2) Next subordinate units.
 - (3) Supported units.
- c.* Observation posts, when appropriate.
- d.* Command posts:
 - (1) Unit issuing order.
 - (2) Next subordinate units.
 - (3) Supported units.

Check list—recommendations for
EMPLOYMENT OF THE ARTILLERY¹

1. General employment of the artillery to include—
Mission—general mission to include area in which the mass of the artillery must be able to concentrate its fire.
Lines to be reached by guns and howitzers.
2. Organization of the artillery for combat, to include also—
Positions to be occupied by each major subdivision.
Assignment of support missions.
3. When attached artillery will revert to the control of its normal commander.
4. Any limitations which should be placed on—
Time of opening fire of any part of the artillery.
Amount of artillery to fire in support of any phase of the operation.
5. Employment of antitank or accompanying artillery, if any, to include amounts and general locations.
6. Aviation to be placed at the disposition of the artillery commander and the general missions to be assigned to it.
7. Locations and missions for antiaircraft artillery, if any present.

¹ Whenever an artillery commander is required to make recommendations regarding the employment of the artillery, he should include such of the items shown in this form as are appropriate to the situation.

**Check list—Field Artillery paragraph of a
DIVISION FIELD ORDER ¹**

* * * * *

3. c. Designation of unit.

General mission of the division artillery. The area in which mass of fire is to be placed; distant and lateral range lines to be reached by specific amounts and types of artillery; hour of beginning and duration of preparation; general instructions concerning employment of local and general counterpreparation.

Missions and position areas of subordinate tactical units.

A separate subparagraph for each unit, giving:

Designation of unit. When groupments are formed, give designation, composition, and commander.

Assignment to support mission. Direct or general support, or attached.

Special fire missions. As appropriate to the situation, such as for:

Attack:

Prior to attack.

During preparation.

During attack.

Defense:

Prior to enemy attack.

Counterpreparation.

During enemy attack.

General position area. Usually included only when special restrictions should be placed on locations, or to furnish information to the command. More frequently included for the artillery in general support than for the artillery in direct support.

¹ In using this check list it should be understood that it would be very exceptional for all the items listed to be included in the artillery subparagraph of a division field order. A situation which would necessitate inclusion of all or most of the items probably would call for an artillery annex. However, there are situations in which any one of the items listed should be included in the artillery subparagraph. In general the artillery subparagraph should be brief. It should contain only such matter as is necessary for a directive for the artillery and for such information to the remainder of the division as is necessary for the coordination of its action with that of the artillery.

Special instructions. Includes any instructions applicable to two or more units, such as:

Use of chemicals.

Movements.

Restrictions as to fire.

Reconnaissance.

Measures for secrecy and deception.

Reference to artillery annex when issued.

Check list—Field Artillery paragraph of a

CORPS FIELD ORDER

* * * * *

3. c. General mission of the artillery with the corps.

Division artillery.

Organization for combat—allotment of reinforcing artillery to divisions; time and place of attachment and relief.

Special fire missions, as appropriate to the situation, such as—

Attack:

Prior to attack.

Preparation.

During attack.

Defense:

Prior to enemy attack.

Counterpreparation.

During enemy attack.

Instructions necessary to insure cooperation between artillery of adjacent divisions.

Corps artillery.

Mission, to include area in which the mass of the fire is to be placed.

General location of position areas.

Organization for combat, support missions and zones (when appropriate includes groupment designations, composition, and commanders).

Special fire missions. (Same as special fire missions above.)

General instructions applicable to all artillery with the corps.

Preparation (time and duration, object of).

Counterpreparation (general instructions, such as employment of general counterpreparation and authorization for local counterpreparations).

Use of chemicals.

Instructions necessary to insure cooperation between division and corps artillery (limiting line for harassing and interdiction, counterbattery, reinforcing fires, etc.).

Instructions or restrictions as to movements, occupation of positions, registration, etc.

Reference to artillery annex when issued.

■ 10. ANNEXES.

FIELD ARTILLERY ANNEX (DIVISION)

ANNEX ----- TO FO -----, ----- DIV
FIELD ARTILLERY

(Insert the field order of the division artillery commander
including heading and ending.)

(Signature)

(Authentication)

Distribution:

FIELD ARTILLERY ANNEX (CORPS OR ARMY)¹

ANNEX ----- TO FO -----, ----- CORPS
FIELD ARTILLERY

Title

Place

Date and hour

Maps:

1. Pertinent references to the corps field order, annexes, and appropriate summaries of intelligence; additional information of the enemy or supported troops, when necessary or desirable.

¹ This form applies specifically to a corps artillery annex. When used for an army artillery annex, substitute "artillery with the corps" for "division artillery," "army artillery" for "corps artillery," and "artillery with the army" for "artillery with the corps." While the form includes those items usually necessary, additional items

2. The general mission of the artillery with the corps.

3. a. Division artillery.

(1) Attachments to each division; time and place of attachment and time and place of relief if known.

(2) A separate numbered subparagraph for each division to which it may be necessary to give particular instructions, such as for contingent zones, coordination of fires laterally and in depth, special missions including general location of fires during the preparation or counterpreparation.

(3) A numbered subparagraph containing the miscellaneous provisions not covered elsewhere and applicable to more than one division, such as:

Time of opening fire.

Restrictions on fire.

Coordination with corps artillery units, including allocation of counterbattery missions to the division artillery.

General limits in depth for harassing and interdiction fires and fires on targets of opportunity.

Accompanying artillery.

Roving artillery.

Movement into position and changes of position.

Allotment of observation facilities (both air and ground) and communication therewith.

Use of special ammunition, including gas and smoke.

Areas reserved for corps or army artillery.

are included as necessary or desirable. Further, while the listing of the items is that most often appropriate, the general rule for combat orders is that items governing a single unit are listed in the paragraph pertaining to that particular unit; and items governing more than one unit, in the general paragraph. Thus, in the case of an artillery annex to a corps field order, any particular item applying to a division would be listed in the paragraph applying to the particular division, in the general paragraph applying to the divisions, or in the general paragraph applying to the artillery with the corps, as appropriate.

b. Corps artillery.

- (1) Organization for combat. If groupments are formed, give composition and commander of each.

- (2) For each of the above designated units, a separate numbered subparagraph giving instructions to include:

Zones of responsibility in depth and width for interdiction and harassing fires, fires on targets of opportunity, and counterbattery. Contingent zones.

Special missions, including general location of fires during the preparation or counterpreparation, and reinforcement of the fires of the division artillery on call.

Position areas, routes, movement into position, organization of the position, and priority of selection in reserved areas.

Changes of position during action, including time or priority, and routes to new position areas.

- (3) A numbered subparagraph containing instructions for attached balloon units and instructions regarding all aviation available for observation for the corps artillery.
- (4) A numbered subparagraph containing instructions for observation (sound-and-flash) battalions.
- (5) A numbered subparagraph containing the miscellaneous provisions not covered elsewhere and applicable to more than one subdivision of the corps artillery such as:

Reconnaissance.

Use of special ammunition, including gas and smoke.

Liaison instructions.

c. Artillery with the corps.

Miscellaneous provisions applicable to both the division and corps artillery not specifically covered elsewhere, such as:

General nature of the fires prior to the attack or counterpreparation.

General instructions covering schedule fires, including preparation or counterpreparation.

Measures to insure secrecy, including limitations on registration.

Limitations on ammunition expenditure.

Topographical and meteorological data.

Antiaircraft and antimechanized defense.

4. Reference to the corps administrative order; additional instructions when necessary or desirable.
5. Instructions covering signal communication and command posts, as necessary or desirable.

(Signature)

(Authentication)

Annexes:

Distribution:

■ 11. OPERATION MAP.—*a. Contents.*—(1) An operation map is a graphic representation of that part of a commander's field order which can be shown intelligibly upon a map. It shows important details of known enemy dispositions, location of friendly troops in contact with the enemy, and contemplated dispositions and plan of action of our own troops.

(2) Items that may appropriately be placed on an operation map are estimated hostile strength; location of known enemy lines and artillery positions; type of enemy artillery discovered; location of friendly covering forces and other troops in contact with the enemy; line of departure; boundaries between zones or sectors of major elements of the command; time of attack, assembly positions and objectives of major elements; defensive organizations; limiting lines for artillery fires; artillery position areas; areas gassed or to be gassed; location of command posts, observation posts, and axes of signal communication of the command and of major subordinate elements.

(3) At times, the items listed in (2) above may be supplemented by brief notes written on the operation map, so that the entire order is contained on the map. This procedure is particularly applicable when fragmentary orders are being issued in a moving situation.

b. Preparation.—(1) The enemy dispositions, contemplated dispositions of our own troops, and plan of action are placed upon the map before the field order is formulated. The map is prepared by the operations and training section. Copies should be in the hands of the subordinate commanders at the time of issue of an oral or dictated field order and should accompany the field order if the latter is issued in written form.

(2) In the preparation of operation maps, the following points should be observed:

(a) The meaning of all data shown must be unmistakable.

(b) Authorized conventional signs, symbols, and abbreviations should be used. If unusual symbols are used, a legend explaining such symbols should be placed on the map. Explanatory wording should be placed on the map where necessary.

(c) The amount of detail which is placed upon the map must be limited to that which can be shown without destroying its legibility.

(d) When colors are used, data relating to friendly troops or operations are shown in blue and similar data relating to the enemy are shown in red. An exception to this rule is that a gassed area to be avoided, whether in enemy or friendly territory, is always shown in red. When colors are not used, hostile and friendly dispositions are distinguished by suitable differing symbols.

(e) When the operation map is issued, it should bear an inscription showing it is an annex to the field order it accompanies, the annex number, the fact that it is an operation map, the title, and the distribution (usually "Same as FO"). In the event that it is issued in the form of an overlay, there should be included thereon a reference to the map used in its preparation and at least two definitely located points, easily distinguishable on the map, for purposes of orienting the overlay with respect to the map. The inscription to be placed on an operation map issued in the form of an overlay should be in the following form:

ANNEX 1 TO FO 6 1ST FA BRIG

Opn Map (Special Map No. 3, AEC (1936), 1:21,120).

By command of Brig Gen E

X

Lt Col, FA

Ex O

OFFICIAL

Y

Maj, FA

Distribution: Same as FO 6.

(f) Before issue, the operation map should be carefully checked for completeness and accuracy by an officer of the operations and training section of the staff.

c. Repetition of details.—An operation map obviates the necessity of repeating in an order details which have been shown thereon graphically, except where repetition is necessary to insure clarity. By use of an operation map, the order may be materially shortened, time saved, and errors due to misunderstanding and misinterpretation avoided. This is particularly true of dictated and oral field orders. A well-prepared operation map is clearer and means more to a trained man than any number of words in an order.

d. Reference in the order.—When an operation map is issued with a written field order, reference is made to the map in at least two places in the order; in the heading and in the list of annexes. Subordinates are thus warned that details pertaining to their respective units and duties may appear on the map without repetition in the order. Reference to the operation map in the body of the order is usually limited to those subparagraphs or numbered paragraphs, which, because matter normally contained therein has been completely shown on the operation map, would without such reference be entirely blank; and to those subparagraphs which without such reference would be misleading.

e. Form.—The form of the operation map depends primarily upon the supply of maps available. When the supply is ample, the information is placed directly on a sufficient number of copies of the map for complete distribution. This is the most accurate method. When the supply is limited

and subordinates have copies of the map upon which the operation is planned, the information may be transcribed on overlays, or a sufficient number of rough sketches may be prepared.

SECTION IV

TRAINING PROGRAMS AND SCHEDULES

■ 12. PROGRAMS.—The following guides are for use in preparing programs:

BATTALION AND REGIMENTAL HEADQUARTERS BATTERIES

Subjects	Text reference	Total hours	Hours per week													
			Recruit period	Battery period									Battalion period	Regimental period		
				1	2	3	4	5	6	7	8	9			10	11
<i>Basic</i> (entire battery)			(*)	(*)												
Articles of war; regulations and discipline.	MCM; FM 21-50.....	2	2													13
Military courtesy.....	FM 21-50.....	1	1													
Sex hygiene.....	FM 21-10; AR 40-235.....	1	1													
Hygiene, and sanitation.....	FM 21-10; AR 40-205.....	1	1													
First aid.....	FM 21-10.....	2	1	1												
Care and display of equipment; tent drill.	FM 21-15.....	5	2	3												
Interior guard duty; manual of the pistol.	FM 22-5, 23-35, 26-5.....	3	3													
Defense against chemical attack	FM 21-40.....	5	2	3												
Dismounted drill and physical training.	FM 6-5, 21-20, 22-5.....	34	6	6	3	3	3	3	2	2	2	1	1	1	1	1
Pistol marksmanship.....	FM 23-35.....	8	4	4												
														</		

* All men will receive the same training during the first two weeks. (See par. 22, FM 6-5.)

† Weekly totals will be divided into daily periods of equal length. Ceremonies and organized athletics will be conducted during other than scheduled hours.

BATTALION AND REGIMENTAL HEADQUARTERS BATTERIES—Continued

Subjects	Text reference	Total hours	Hours per week													
			Recruit period		Battery period								Battalion period		Regimental period	
			1	2	3	4	5	6	7	8	9	10	11	12	13	
<i>Basic (entire battery)—Con.</i>																
Inspections (battery or higher unit).	FM 6-5, 21-15.....	26	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Total basic.....		88	25	19	5	5	5	5	4	4	4	3	3	3	3	3
<i>Technical</i>																
<i>Entire battery:</i>		(c) 8	4	4												
'Announcers' instruction.....	FM 6-50 to 6-110, and 6-125.	8	4	4												
Motor vehicle operation.....	FM 6-5, 25-10; MTTSB Z-10.															
or																
Equitation and driving.....	FM 6-5, 25-5.....	11	6	5												
Motor maintenance.....	FM 25-10.....															
or																
Stables.....	FM 25-5.....	32	8	8												
Marches and camps, over-night; camouflage.	FM 5-15, 5-20, 6-5, 6-20, 6-130, 21-10, 25-5, 25-10.															

Loading on train	FM 6-20, 6-130, 25-5, 25-10.	4								4		
Subtotal		63	14	21	8			8		4		
Scouts: instruction, fire direction, and command-post men:		(^d)			(^c)	(^c)						
Instruments, firing data, survey, map reading, and fire direction.	FM 6-20, 6-40, 21-45, 21-30, 21-35; TM 6-200 to 6-220, incl.	271			28	36	32	24	29	21	22	18 14
Linemen: telephone, telegraph, switchboard, and radio operators; message center clerks; visual signalmen:												
Communication		(^d)			(^c)	(^c)						
Command post or communication exercises (battalion or higher unit).	FM 6-20, 24-5; TM 11-450.	235			28	36	28	20	25	17	18	14 10
		36					4	4	4	4	4	4 4
Subtotal		271			28	36	32	24	29	21	22	18 14

* Personnel will be trained in the performance of more than one duty; for example, instrument men will receive some training as drivers or chauffeurs, drivers as cannoners or signalmen, etc.

^d The time allotted for specialist instruction does not provide for stables or equitation. In animal-drawn units, the time allotted here must be reduced by an amount sufficient for scheduled stables. Mounted men will be rotated between equitation and training in their specialty in order to insure proficiency in both.

* Members of the battery detail will receive their basic specialist training in a battalion school during the 3d and 4th weeks. Radio operators for key sets should be trained in a regimental school.

BATTALION AND REGIMENTAL HEADQUARTERS BATTERIES—Continued

Subjects	Text reference	Total hours	Hours per week														Regi- men- tal period
			Recruit period	Battery period										Battal- ion period			
				1	2	3	4	5	6	7	8	9	10	11	12		
<i>Basic (entire battery)—Con. Drivers:</i> Motor vehicle operation Difficult traction Motor maintenance Detail instruction (instru- ment or communication).																	

GUN (HOWITZER) BATTERY

Subjects	Text reference	Total hours	Hours per week													Regi- men- tal period			
			Recruit period		Battery period									Battal- ion period					
			1	2	3	4	5	6	7	8	9	10	11	12					
<i>Basic (entire battery)</i>			(a)	(a)															
Articles of war; regulations and discipline.	MCM; FM 21-50	2	2															13	
Military courtesy	FM 21-50	1	1																
Sex hygiene	FM 21-10; AR 40-235	1	1																
Hygiene and sanitation.	FM 21-10; AR 40-205	1	1																
First aid	FM 21-10	2	1	1															
Care and display of equipment; tent drill.	FM 21-15	5	2	3															
Interior guard duty, manual of the pistol.	FM 22-5, 23-35, 26-5	3	3		(Additional training with guard duty)														
Defense against chemical attack	FM 21-40	5	2	3															
Dismounted drill and physical training.	FM 6-5, 21-20, 22-5	34	6	6	3	3	3	2	2	2	1	1	1	1				1	
Pistol marksmanship.	FM 23-35	8	4	4	(Additional training with technical subjects)														
Inspections (battery or higher unit).	FM 6-5, 21-15	26	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Total basic		88	25	19	5	5	5	5	4	4	4	3	3	3	3	3	3	3	

<i>Technical</i>		(a)																		
<i>Entire battery:</i>																				
Cannoneers' instruction.....				8	4	4														
Motor vehicle operation.....																				
or																				
Driving and equitation.....																				
Motor maintenance and																				
care of matériel.																				
or																				
Stables and care of matériel.....																				
Marches and camps, over-																				
night.																				
Service practice.....																				
Loading on train.....																				
Subtotal.....				131	14	21	8	4	4	4	12	8	8	16	12	8	8	8	8	8

^a All men will receive the same training during the first two weeks. (See par. 22, FM 6-5.)

^b Weekly totals will be divided into daily periods of equal length. Ceremonies and organized athletics will be conducted during other than scheduled hours.

^c Personnel will be trained in the performance of more than one duty; for example, cannoneers will receive some training as drivers or with the detail, drivers as cannoneers or with the detail, etc.

^d Includes the firing of subcaliber and service ammunition. The time allotted is considered desirable for this subject, but the actual time scheduled will be based on the ammunition available. Some ammunition should be reserved for day and night firing on field exercises. Additional instruction in driving and equitation may be given concurrently with service practice.

GUN (HOWITZER) BATTERY—Continued

Subjects	Text reference	Total hours	Hours per week													
			Recruit period		Battery period								Battal- ion period		Regi- men- tal period	
			1	2	3	4	5	6	7	8	9	10	11	12		
<i>Technical—Continued</i>																
<i>Cannoneers:</i>																
Cannoneers' instruction.....	FM 6-50 to 6-110; 6-125.....	108			20	14	10	11	11	11	8	9	6	6		2
Difficult traction.....	FM 6-5, 25-5, 25-10; MTTSB Z-10.	23			3	4	4	4	4	4						
Care of matériel.....	FM 6-50 to 6-110.....	• 56			5	6	6	5	6	6	5	5	4	4		4
Camouflage and field fortifi- cations.	FM 5-15, 5-20, 6-130.....	16				8	8									
Subtotal.....		203			28	32	28	20	21	21	13	14	10	10		6
<i>Drivers or chauffeurs:</i>																
Motor vehicle operation..... or	FM 6-5, 25-10.....	108														
Equitation and driving.....	FM 6-5, 25-5.....				20	14	10	11	11	11	8	9	6	6		2
Difficult traction.....	FM 6-5, 25-5, 25-10; MTTSB Z-10.				3	4	4	4	4	4						

[illegible]

- To be divided into equal daily periods except when all day marches or field exercises are scheduled.

The time allotted for specialist instruction does not provide for stables or equitation. In animal-drawn units, the time allotted here must be reduced by the amount shown under drivers for stables, so as to provide stables for the specialist detail. Mounted men will be rotated between equitation and training in their specialty in order to insure proficiency in both. The same principle applies to cannoners in horse regiments.

Members of the battery detail will receive their basic specialist instruction in a battalion school during the 3d and 4th weeks.

One 2-week course to be conducted by battalions. Two men per authorized automatic rifle to attend.

GUN (HOWITZER) BATTERY—Continued

Subjects	Text reference	Total hours	Hours per week													Regi- men- tal period	
			Recruit period		Battery period								Battal- ion period				
			1	2	3	4	5	6	7	8	9	10	11	12	13		
<i>Tactical (entire battery)</i>																	
Battery field exercises.....	FM 6-5, 6-20, 6-130, 21-5, 30-25.	36 44 28															
Battalion field exercises.....																	
Regimental field exercises.....																	
Total tactical.....		108					4	4	8	8	8	12	20	20		24	
Open time.....		42	5	4	3	3	3	3	3	3	3	3	3	3		3	
Grand total.....		572	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44

¹ In the application of this program, the provisions of FM 21-5 will be followed.

■ 13. WEEKLY SCHEDULE.—The following training schedule is for use as a guide in preparing weekly schedules:

TRAINING SCHEDULE

From	to		Battery				Field Artillery		
(Date)	(Date)		(Station)				(Date)		
Day and date	Hours		Personnel participating	Character of training	Place	In charge	Uniform and equipment	Text references including paragraphs	Remarks
	From	To							
Monday March 9.	7:00	7:30	Btry	Physical training	Drill ground	Lt. C		(*)	R e m o v e shirts.
	7:30	8:30	½ Btry	Cannoneers' instruction—no-menclature and functioning.	Gun park	Lt. A	4 guns	(*)	These three groups to be rotated hourly.
	8:30	9:30	½ Btry	Motor vehicle operation—preliminary instruction.	Motor park	Lt. B	10 trucks	(*)	
	9:30	10:30	½ Btry	Dismounted drill—position of the soldier, rests, facings, salutes.	Drill ground	Lt. C		(*)	
	10:30	11:30	Btry	Articles of war, discipline, AW 1, 2, 29, 54-96 MCM.	Quarters	BC		(*)	
	1:00	2:00	Btry	Personal equipment, care, assembling, adjustment, display.	Quarters	Lt. B	All individual equipment.	(*)	

* Appropriate text reference.

TRAINING SCHEDULE—Continued

From ----- to -----
 (Date) (Date)

Battery -----, ----- Field Artillery
 (Station) (Date)

Day and date	Hours		Personnel participating	Character of training	Place	In charge	Uniform and equipment	Text references including paragraphs	Remarks
	From	To							
	2:00	3:00	Btry	Manual of the pistol	Btry street	Lt. C	Belts and pistols.	(*)	
	3:00	4:30	$\left\{ \begin{array}{l} \frac{1}{2} \text{ Btry} \\ \frac{1}{2} \text{ Btry} \end{array} \right.$	Care of matériel Motor vehicle instruction— preliminary instruction.		Lt. A. Lt. B.	Fatigue clothes.	(*)	These groups to be rotated Tuesday.

* Appropriate text references.

SECTION V

RECORDS AND REPORTS

■ 14. GENERAL.—The following table gives a summary of the disposition of the various records and reports:

Form	DISPOSITION					Remarks
	Battery or Similar Unit	Battalion	Regiment	Brigade		
Unit Journal	None	To regiment, or next higher echelon.	Same as battalion	File, or as directed by higher authority.	Permanent record of unit. (See AR 345-105.)	
Unit Report	None	As directed by higher authority	To brigade	1. To division 2. To corps artillery officer.		
Observer's Report	To battalion	File with journal	None, unless an OP is established. Used as in the battalion.	Same as regiment.		
Situation Map	None	File with journal	Same as battalion	Same as battalion.		
S-2 Bulletin	None	None	None	See note	See note.	
Firing Chart	File with battery records.	File with S-3 records.	Same as battalion	Same as battalion.		
Observed Fire Chart.	File with battery records.	File with S-3 records.	None	None.		
Fire-Mission Form.	None	File with S-3 records.	None	None.		
Ammunition Report.	To battalion	To regiment or division artillery Hq.	To brigade	1. To division. 2. To corps artillery officer.		

NOTE.—The S-2 bulletin is prepared in the S-2 section of the staff of the corps artillery officer. It is distributed to the army and to the artillery with the corps to include battalions. It may be issued by the division artillery S-2 when the division is acting alone.

nal entries should not be altered, but may be supplemented by later entries if necessary.

3. **PERIODS COVERED AND DISPOSITION.**—The journal is closed and, with all appropriate supporting documents from the journal file, is submitted as prescribed by higher authority in the particular situation.

■ **16. UNIT REPORT.**—*a.* In division and higher units, each staff section prepares and submits such periodic or special reports pertaining to its activities as may be required. A situation report is usually prepared at stated intervals and furnished other sections of the staff and higher headquarters for their information.

b. In units smaller than the division, a single unit report prepared under the supervision of the executive is usually all that is required.

c. The data contained in this report are submitted to the executive by the chief of each staff section. The report usually covers a period of 24 hours. It may be submitted daily or only when directed by higher authority. Reports close simultaneously at all headquarters at the hour prescribed, usually at the end of the operations performed during daylight. A report may be complete or may contain only certain types of information desired by a higher headquarters. It is signed by the commander or by the executive officer after being approved by the commander.

UNIT REPORT

REPORT

(Organization)

No.-----

Location:-----

Maps:-----

From:----- (date and hour)

To:----- (date and hour)

(Instructions on reverse side)

Annexes:

(Signature)-----
(Grade and organization)-----
(Comdg: Ex O)¹¹ Delete one.

(See instructions on back of this form)

(Back of unit report)

INSTRUCTIONS

1. PREPARATION.

a. By whom.—All field artillery commanders, except battery commanders who are not acting alone.*b. When.*—Daily or as prescribed.

2. CONTENTS.—Such of the following items as are applicable or required by higher authority.

a. Situation.—Refer to, and attach, a copy of the situation map as an annex to the report.*b. Enemy activity.*—Infantry, cavalry, air, etc.; include detailed information of enemy artillery.*c. Own operations.*—Movements, positions. Own firing.*d. Ammunition.*—Amount on hand at close of period; amount available for the period; amount fired, abandoned, or otherwise disposed of.*e. Supply.*—Same as for ammunition.*f. Personnel.*—Number present, changes, and causes of same.*g. Weather.*—During and at the close of the period.*h. Miscellaneous.*—Items not contained in the above headings.

3. DISPOSITION.—To the next higher artillery echelon or as prescribed.

■ 17. S-1 WORK SHEET.—*a.* In order to keep in touch with the personnel situation, it is necessary to enter the latest information in a handy reference file at the time the information is received.*b.* The S-1 work sheet, properly kept with the information entered under the appropriate heading, will be of assistance. The type of information usually desired is that contained in

the index on the front of the S-1 work sheet. Information should be entered under the appropriate heading at the time of its receipt. Each entry should show date, time, time received, and source, and should be in sufficient detail for use in making a summary of this type of information at the close of the period.

S-1 WORK SHEET

INDEX

(Unit)

1. LOCATION OF REAR ECHELON.
2. STRENGTH OF COMMAND: By organization.
3. EVACUATIONS: By organization.
4. CASUALTIES: By organization.
 - a. Killed.
 - b. Sick.
 - c. Gas cases.
 - d. Wounded.
 - e. Captured.
 - f. Missing.
5. REPLACEMENTS.
6. PRISONERS OF WAR.
7. STRAGGLERS.
8. MORALE: By organization, if different.
- 18. OBSERVER'S REPORT.

GROUND OBSERVER'S REPORT

OP No.----- Location----- Sheet No.-----
 Unit----- From----- To-----
 (Hour)
 -----In charge of OP
 Date-----
 Map reference-----

Item No.	Time	Location			Object observed: How many, what doing, what kind, direction of movement?	Reported to: Who? When? How?	Observer's name
		Deflection or magnetic azimuth	Range	Reference points			

NOTE.—Suggested form. May be improvised if none available.

(Back of observer's report)

INSTRUCTIONS

1. **WHEN AND BY WHOM PREPARED.**—*a.* Kept at each artillery observation post when prescribed by the headquarters to which the observation post belongs.

b. Period covered is usually 24 hours. Closes at the hour prescribed by the headquarters to which the observation post belongs.

2. **HOW PREPARED.**—Entries in various columns to be made as follows:

a. Observation.—Record each enemy movement or activity observed by describing as nearly as possible what the observer actually saw.

b. Location.—Select some prominent reference point near center of sector. When practicable report the range and deflection of the object observed with regard to this reference point. If the location with regard to the reference point cannot be determined, report the observation with reference to some easily identified terrain feature in the vicinity of the observation. Even if the location cannot be satisfactorily determined, do not omit the event from the report, but give the general direction or other available information. An event which seems trivial to the observer may be very valuable when added to other information available to higher headquarters. Mark doubtful locations with an interrogation point (?).

c. Observer.—The observer authenticates the entry by placing his name or number in this column.

3. **NUMBER OF COPIES AND DISPOSITION.**—Prepared in duplicate. Forward original to S-2 section of headquarters to which the observation post belongs; retain duplicate.

■ **19. S-2 WORK SHEET.**—In each S-2 section in order to keep constantly in touch with the enemy situation, a ready reference file of important items of enemy information should be available. The S-2 work sheet, properly kept, in combination with the S-2 situation map, meets this need. A satis-

factory S-2 work sheet form is one in which the information is sorted according to subject matter corresponding with the principal items desired in that part of the unit report pertaining to enemy activity. A separate page should be provided for each major subdivision of information. As items of information are received, they are posted on the appropriate page of the S-2 work sheet, showing date and time of the event, source of information, and a summary of the information in sufficient detail for use later in studying the enemy situation and in preparing the unit report. The cover sheet and part II of an S-2 work sheet are shown below.

a. Cover sheet.

**S-2 WORK SHEET
INDEX**

	(Unit)	
Part I		
1. ARTILLERY.		Page
<i>a. Strength, Composition, and Dispositions.</i>		
(1) Located or Suspected Battery Positions and Battalion Areas, by Caliber.....		2
(2) Observation and Command Posts.....		2
(3) Communication.....		3
(4) Ammunition and Supply Installations.....		4
<i>b. Firing: General Nature, such as: Registration, counterbattery, interdiction, harassing; and the area or target receiving the fire.....</i>		5
<i>c. Combat Efficiency and Methods.....</i>		6
<i>d. Reconnaissance</i>		7
<i>e. Matériel.....</i>		8
<i>f. Miscellaneous.....</i>		9
2. FRONT LINES.....		10
3. ORGANIZATION OF THE GROUND.....		11
4. INFANTRY ACTIVITY.....		12
5. AIR ACTIVITY.		
<i>a. Airplanes</i>		13
<i>b. Balloons</i>		14
6. MOVEMENTS.		
<i>a. Troops.....</i>		15
<i>b. Trains.....</i>		16
7. MISCELLANEOUS		17

Part II

8. ENEMY ARTILLERY FIRING.....	18
9. NEW ENEMY BATTERIES LOCATED.....	18
10. ENEMY BATTERY POSITIONS ABANDONED.....	18

b. Part II.

Part II

8. ENEMY ARTILLERY FIRING.

Date and hour	Battery No.	Location	Number of pieces	Caliber	Number of rounds	Objective	Source of information	Remarks

9. NEW ENEMY BATTERIES LOCATED.

Battery number assigned	Location	*Accuracy of location	Number of pieces	Caliber	Remarks

10. ENEMY BATTERY POSITIONS ABANDONED.

Battery number assigned	Location	*Accuracy of location	Number of pieces	Caliber	Remarks

* Use P, Q, R, and S to denote estimated accuracy of location within 50, 100, 150, and more than 150 yards, respectively.

■ 20. SITUATION MAP.—*a.* The situation map is used for graphic representation, by means of the prescribed conventional signs, of the locations, dispositions, and other appropriate data, of both enemy and friendly troops and installations. The S-2 section keeps the situation map posted to show the latest hostile situation, preferably in red. The S-3 section keeps up to date the latest friendly situation, usually in blue. The situation map is usually kept jointly by the S-2 and S-3 sections, but it may be kept on separate maps, depending upon the situation and the convenience of those working with the map.

b. In addition to the situation map showing tactical operations, which is kept by the S-2 and S-3 sections, the S-1 and S-4 sections usually keep such situation maps concerning their respective duties as are appropriate and necessary to their efficient functioning. Such installations and data as affect tactical operations are transferred by the S-3 section to its own situation map.

c. When it is necessary to conserve the supply of maps, the situation may be posted on tracing paper fastened over the map in the manner of an overlay. At convenient intervals a fresh overlay is substituted, pertinent information is transferred from the old to the new sheet, and the old overlay is marked for identification and filed with the unit journal.

■ 21. S-2 BULLETIN.—*a.* The S-2 section of the staff of the corps artillery officer, using the information obtained from all available sources, issues an S-2 (intelligence) bulletin. The bulletin is issued every 24 hours or at longer intervals, at the discretion of the issuing office. The time of issue of the bulletin is coordinated with the hour of closing of the unit reports required of lower units in order that the latest information may be consolidated in the S-2 bulletin. When unit reports are not required, the S-2 bulletin includes information transmitted informally by lower echelons and obtained from other sources.

b. Copies of the bulletin are furnished to the corps and army G-2 sections, to the S-2 section on the staff of the army artillery officer, to the artillery headquarters of adjacent corps, and to subordinate artillery units. Sufficient

copies are furnished for distribution to subordinate echelons down to include battalions.

c. S-2 sections below the staff of the corps artillery officer do not prepare the S-2 bulletin except in the case of a division acting alone. In this situation, the staff of the division artillery officer issues the S-2 bulletin when it is required.

d. The S-2 bulletin consists of two parts. Part I contains information pertaining to all phases of enemy activities under headings corresponding to the headings of part I of the S-2 work sheet. Part II contains detailed information of enemy firing and enemy batteries in the tabular form shown for part II of the S-2 work sheet.

■ 22. ENEMY BATTERY FILE.—a. The enemy battery file is the most important record in the S-2 section of the staff of the corps artillery officer. This record is kept most conveniently in card index form. As each enemy battery is located, a card is started in the form found most satisfactory for practical use and filed in the enemy battery file. All information obtained of that battery position is entered on this card. In recording the location of elements of the battery, both known and suspected elements are noted. In recording the protection of the position, the type of material used in its construction and the estimated caliber of weapons required for counterbattery are noted. A satisfactory numbering system for enemy batteries is to assign to each the number representing the abbreviated coordinates of its location. For example, a battery located at (360.53-736.82) is assigned the number 0568 and retains that number throughout the operation unless changed by proper authority. The number assignment is given each battery by the S-2 section of the corps artillery officer, or by the division artillery S-2 section when the division is operating alone. The number assignment appears when the battery is newly reported in the S-2 bulletin. Information in the enemy battery file needed by the artillery with the corps is distributed by means of the S-2 bulletin.

b. In moving situations, the enemy battery file should be started as soon as the situation permits. It becomes more practicable and important as stabilization develops.

ENEMY BATTERY FILE

No. _____ Caliber and type _____
 (Serial or abbreviated
 coordinates)

LOCATION PROTECTION
 (Coordinates and accuracy: P-50; Q-100; R-150;
 S-more than 150) (Type and degree)
 Gun position _____
 OP _____
 CP _____
 Ammunition _____
 Personnel _____
 Kitchen _____
 Transport _____
 Usual direction of fire, sector of fire, or objective _____

Sources of information:

Sketch or photo of position

Remarks:

(Front of card)

Enemy firing					Own counterbattery			
Date and hour	Rounds and projectile	Reported by	Objective	Damage	Type of fire	Organization assigned	Rounds and projectile	Effect

(Back of card)

■ 23. S-3 WORK SHEET.—The S-3 work sheet affords a ready means of keeping a running record of the friendly situation. Items are entered under appropriate headings which correspond to the headings contained in that part of the unit report pertaining to the situation of friendly troops. When items of information are received they should be entered on the work sheet and then recorded on the situation map. Since the situation map changes frequently, the entries in the work sheet will be of assistance in summing up the situation for a report of any period desired.

S-3 WORK SHEET

INDEX

	----- (Unit)	
		Page
Part I		
1. Our front lines-----		1
2. Location of troops-----		2
3. Information of adjacent units and supporting or supported troops-----		3
4. Weather and visibility-----		4
5. Our operations for period-----		5
Part II		
6. Own firing -----		6

- b. Ammunition:** Amount, type, and caliber (if applicable) of ammunition and fuzes on hand at the beginning of period, received, expended, and on hand at close of period.
 - c. Equipment.**
 - d. Other supplies.**
- 3. STATUS OF EVACUATION:** By whom and progress.
- 4. CONDITION OF ROADS AND STATUS OF CIRCULATION.**
- 5. SALVAGE AND CAPTURED MATERIAL.**
- 6. BURIALS:** By whom, location of cemeteries.
- 7. ACTIVITIES OF SUPPLY TROOPS:** Of particular importance or of unusual nature, other than routine.

■ **25. AMMUNITION REPORT.**—*a.* During active operations, an ammunition report is submitted daily at a prescribed hour. Initiated by batteries, the reports are transmitted through the following channels: battalion, regiment,¹ brigade or division artillery officer, corps artillery officer, army artillery officer, and army G-4. The reports are telephoned and then confirmed in writing. The telephonic report usually comprises a statement of the number of rounds expended and the number on hand; the written report is more detailed.

b. The report of each superior headquarters is a consolidation of the reports of subordinate units.

c. The division and corps artillery officer each transmits a copy of his report to G-4 on the staff of his commanding general; the corps artillery officer also transmits a copy to the corps ordnance officer.

¹ Where appropriate.

AMMUNITION REPORT

Unit_____

Location_____

From_____ (hour and date)

To_____ (hour and date)

	(Types of projectiles, fuzes, etc.)					
	HE shell*	Gas shell*	Smoke shell*		Fuze*	Fuze*
ON HAND (Last report)						
RECEIVED (During period)						
TOTAL OF ABOVE						
EXPENDED (During period covered by re- port)						
ON HAND (At close of period)						

*List each type separately.

NUMBER AND CALIBER OF GUNS:

REMARKS:

(Signature)

(See instructions on back of this form)

(Back of ammunition report)

INSTRUCTIONS

1. **PREPARATION.**—The report of each headquarters is a consolidation of the reports of subordinate units.

2. BY WHOM PREPARED.

a. Batteries.—By ammunition sergeant under supervision of executive.

b. Battalion supply and ammunition battery.—Under supervision of its commander.

c. Battalions and higher units.—By S-4.

3. NUMBER PREPARED.—One copy only forwarded to each addressee. Additional copy or copies as required by practice in unit rendering report.

4. DISPOSITION.—Battery ammunition to battalion; battalion to regiment**; regiment to brigade*; brigade* to corps artillery officer; corps artillery officer to army artillery officer; and army artillery officer to army G-4. The division artillery officer transmits one copy of his report to the division G-4. The Corps artillery officer transmits one copy of his report to corps G-4 and one to the corps ordnance officer.

5. PERIOD COVERED.—24-hour period, or as prescribed by higher authority.

■ **26. FIRE MISSION FORM.**—The fire mission form is for the purpose of assisting personnel of the fire direction center in placing the fire of a battery on a target.

*Division artillery officer in "triangular" division.

**Where appropriate.

FIRE MISSION FORM

OBSERVED FIRE

FIRE MISSION
BATTERY _____
BASE DEFLECTION
Right_____
Left_____
CONVERGE AT _____
ON NO. 1 OPEN _____
SITE _____
AMMUNITION ANDFUZE

BATTERY { Right_____
{ Left_____
{ One round_____

Front

DESIGNATION _____	

BN. NO.--- LN. SET NO.---	

Adjusted data:	
Deflection: BD _____	
Range _____	

Rounds expended _____	
Time: From _____ To _____	

Commands	Sensings
_____	_____
_____	_____
_____	_____
_____	_____

Reverse

SECTION VI

CAMOUFLAGE AND FIELD FORTIFICATIONS

■ 27. CAMOUFLAGE MATERIALS AND CONSTRUCTION METHODS.
(See also FM 5-20).—*a. Classes of materials.*—Camouflage materials are of three classes; natural, debris, and artificial.

(1) *Natural materials.*—(a) Natural materials include green vegetation such as fresh grass and foliage, branches in leaf, sod, etc.; and dry vegetation such as dead leaves, bare

brush, etc. Natural materials possess the following advantages and disadvantages as compared to artificial materials:

1. Advantages.

- (a) Natural materials match the color and texture of the locality more easily when properly used.
- (b) They are effective against all types of aerial photographs, particularly the infrared and color photographs.
- (c) They reduce the quantity of camouflage supplies to be furnished from the rear.

2. Disadvantages.

- (a) Natural materials cannot be prepared in advance for quick erection; all work must be done at the site.
- (b) Green vegetation must be renewed frequently to replace wilted material, requiring exceptionally strict discipline of maintenance personnel to prevent making visible tracks.

(b) Vegetation, green or dry, can be placed directly on and around an object or can be supported over an object to form an overhead cover. Green vegetation must be placed in its natural position, otherwise it will reflect light differently and show up in aerial photographs. For example, leafy branches thrown upside down photograph too light because the underside of a leaf is a different color from the upper side. Dry vegetation can be placed in any position, although it is better to place it as naturally as possible. With both green and dry vegetation, the density of cover must be such as to match the texture of the locality. In making an overhead cover of green vegetation, two methods are successful. One method is to stretch wires overhead at different heights and in several directions, fastened to trees or posts, and to suspend small trees, branches, or shrubs by their tips from these wires. A second method is to stretch strips of chicken wire on a suitable supporting frame, placing the strips side by side without overlap and without fastening the adjacent edges together. Men work from underneath through the slits between the strips and stick out green branches, shrubs, etc., into the chicken wire in natural growing position so that

the butt ends project down 8 to 12 inches. The butt ends are then wired so as to hold the branches upright. Dry vegetation used for overhead cover can be thrown on the supporting frame in any position. The proper texture is secured by varying the density of material.

(2) *Debris*.—Debris includes primarily materials such as are likely to be found in a shell-torn village, battlefield, or similar locality. Debris suitable for camouflage usually occurs only in localities where the terrain pattern is very intricate and confused, with many irregular forms and patterns. Debris is placed over and around an object so as to break up its form and shadow into an irregular pattern which will blend with the surrounding pattern. Debris requires no renewal and little maintenance, but its use is limited to suitable localities.

(3) *Artificial materials*.—(a) *Fish nets*.—Because of their portability, fish nets are used principally in mobile situations for artillery matériel and trucks, etc. They are issued in standard sizes with 2½-inch mesh. The net for field artillery matériel and trucks is 36 feet by 44 feet. Fish nets are used to provide overhead cover for an object as follows:

1. As a flat-top supported by poles and guy wires in a hastily prepared position (fig. 3).
2. As a flat-top supported on a wire frame above the object in a deliberately prepared position (figs. 7, 8, and 12).
3. As a drape placed over and around the object (as for trucks) (fig. 5).

Fish nets shrink when they are wet and expand as they dry out; hence, when used as flat-tops they must be adjusted with each change in weather conditions. They deteriorate more quickly than chicken wire and should therefore be used for the more temporary installations. When fish nets must be installed initially in positions which will be occupied for a long time, they should be replaced with chicken wire at the first opportunity. When not in use, fish nets should be folded carefully in such a way that they can be unfolded for use without confusion. The best method is shown in figure 6.

(b) *Chicken wire*.—Chicken wire is issued for use in standard strips 6 feet wide by 30 feet long, having a 2½-inch

nesh. It is normally used, in more or less stable situations, for overhead flat-top covers supported on wire frames. Compared to fish nets, chicken wire can bridge longer gaps between supports without sagging, is more permanent, will not shrink or expand because of moisture conditions, and in case of fire will not drop the whole fabric on men and material underneath; but it is more bulky, less easily handled, and is too stiff for use as a drape.

(c) *Garlands*.—Garlands are made by doubling over a 40-inch length of 2-inch wide burlap or osnaburg (a cotton cloth something like heavy unbleached muslin), and knotting the doubled length in the center. These knots are then secured to a light wire framework at 8-inch intervals in such a way that they will not slide on the wire. Garlands are useful for thickening overhead cover, whether natural or artificial, and for extending irregularities in the edges of nets (fig. 7).

b. *Procedure*.—(1) *Shape of covering surface*.—(a) Fish nets used under trees, among bushes, or in rough, uneven ground may be set up loosely with wires or propped up by poles. This gives a rough-appearing surface with many dark shadows and light spots which photographs like bushes or uneven ground. The square shape of the net should be broken up to fit in to the brush or trees by covering parts of the net with brush or by building out the sides of the net with brush hung on wires.

(b) Fish net or chicken wire camouflage on open, level ground should be stretched taut and parallel to the slope of the ground. If not stretched parallel, it will cast shadows so as to make its form discernible. If possible, it should be arranged to have the shadows which will be cast on the north, east, and west sides of the cover taken up by a hedge, building, trench, or similar feature. When there is no existing edge for one of the sides, exaggerated irregularity of outline of the camouflage is absolutely essential; not irregularities of 2 to 6 feet, but of 20 to 30 feet. Right lines and especially right angles cause camouflaged objects to be easily discovered on air photographs.

(c) A flat-top used to conceal a large, high object (about 10 feet or more above the ground) should be "terraced" by

placing additional smaller flat-tops under the edges of the main flat-top. The small flat-tops should be about half-way between the ground and the main flat-top and should extend both under and outside of the edges of the main flat-top. Their functions are to prevent oblique observation under the main flat-top and to assist in breaking up the shadows of the edges.

(d) In the open, mound-shaped camouflage with closed, sloping sides makes the occupant feel safer, but in most cases it is easily discovered on an air photograph, because the sides away from the sun reflect but little light compared to the sides toward the sun and therefore show up much darker, revealing the unnatural mound-shaped object.

(2) *Standard methods of erecting wire frame.*—Flat-top overhead covers of chicken wire or fish net must be supported on some kind of frame, ordinarily of wire. The two methods of erecting wire frames described below require only soft wire, rough stakes and posts, and a few nails. They are easy even for untrained men to erect. Posts for wire frames should be about 3 inches in diameter, cut square at the top and sharpened at the bottom, and about 6 inches longer than the desired height of net. Use only soft steel or iron wire, about No. 12 or heavier, for wire frames. If only hard wire is obtainable, it is easily annealed by heating it until red hot and allowing it to cool gradually. It is impossible to do good work with hard wire.

(a) The following method lends itself to any size or shape of cover and may be used to support either a garnished net or plain chicken wire used as a base for natural materials. (See fig. 8.) It is slower than the method described in (b) below, but provides a more permanent frame.

1. Lay out posts about 12 feet apart in each direction in area to be covered.
2. Drive outside rows of posts into the ground just far enough to stand alone, and drive strong guy stakes about 12 feet out from them.
3. Drive two nails in head of each post, about 1 inch apart.
4. Wind one end of wire coil fast around head of a corner post, then take a turn around guy stake

and back over top of post between nails, forming a double guy.

5. Stretch wire along line of posts, using several men. Support wire by a nail about 1 foot below top of last post of the row, then give it a turn around guy stake, bring it back and make it fast to top of post. Cut wire from coil at this point.
6. Push wire up over tops of all posts in the row and seat it between the nails, thus stretching it tight.
7. Proceed similarly with each parallel line of posts, then in the same manner, run wires at right angles to the first series, forming squares.
8. Run diagonal wires across each line of posts, placing the wire between the nails.
9. Tighten all guy wires by twisting with a rack stick or large nail. Tighten diagonal wires in the same manner at all crossings. This will tighten the whole frame.
10. Clinch nails over wires. Drive them down flat to avoid catching net when spread.
11. After erection, any of the interior posts may be shifted in position to accommodate the needs of the occupying troops without affecting the stiffness of the frame. By placing additional posts on the edge and wiring them as above, any irregular shape may be made.

(b) The following method is used primarily to support fish nets, but may be used to support chicken wire and natural materials. Because posts are required only along the edges, it is more suitable for camouflage construction over guns and their crews. In addition to soft wire, stakes, posts, and nails, a steel or heavy wire ring about 6 inches in diameter is needed. (See fig. 12.)

1. Lay out posts at intervals of about 12 feet around edge of area to be covered by the net, and drive them in the ground so they will stand alone.
2. Lay out wires which run radially from ring in center of area, over tops of posts, and down to stakes. Cut these wires about 15 feet beyond each post.

3. Place wires which run to one set of opposite corners over their respective posts and stake ends down. The wires are held in place on the posts by clinching a nail on them. The posts should be leaned toward the center about 1 foot when the wires are first staked down; then the posts are pushed out until erect, tightening the wires. Wires can be tightened further by driving the stakes deeper.
4. Repeat step 3 above for wires running to the other set of opposite corners, then continue with each opposite set of wires until all are erected.
5. Place two additional guys on each corner post.
6. Run a wire around outside of posts, fastened to each post near the top with a nail.
7. Run two or three irregular concentric rings of wire around the "spokes" of the frame near outer edge to keep net from sagging between spokes.
8. Use interior posts or props where needed to keep net level.

(3) *Method of erecting a hasty support for fish net.*—Figure 3 shows a fish net erected over a light gun using a hasty method as follows:

(a) *Materials required:*

- 9 poles, 3 inches in diameter and about 6 feet long (poles similar to latrine screen poles are desirable. If they are not available, a large spike, about 60-penny, should be driven into the top of each pole).
- 12 long tent pins.
- 12 lengths of wire about 15 feet long, made into loops.

(b) *Spread fish net on ground.* Place a pole at each corner and drive tent pins in prolongation of each edge of net about 5 feet beyond the corners. Loop wires over top of pole. Raise net by means of four corner poles and center pole. Tighten net by having personnel pull net at each corner and by twisting wires by means of a rack stick. Corners must be tightened simultaneously. Place additional poles along edges of net and tighten by guy wire loops in the manner described for the corner guys. Garnish net as described in (4) below.

(4) *Garnishing*.—The standard material for garnishing is 7-ounce, 40-inch wide osnaburg (a cotton cloth something like heavy unbleached muslin). Burlap may also be used.

(a) Both fish nets and chicken wire are garnished by weaving strips of osnaburg about 5 feet long and 2½ inches wide, into the net along irregular lines. Each end of each strip is allowed to dangle about 8 inches from underside of net.

(b) In garnishing fish nets, the strips of osnaburg are woven close together in the center of the net so that about 70 percent of the mesh openings are covered. The garnishing is thinned out gradually at the edges of the net. Garnishing should be very irregular in outline. (See fig. 13.) The thickly woven central portion serves to conceal what may be under it and the thinned edges cast a faint, indeterminate shadow which, merging into the inequalities of the terrain, renders it unnoticeable in aerial photographs. Since the thinned edges allow objects under them to show, the cover must be much larger than the object over which it is placed.

(c) Each standard strip of chicken wire is garnished throughout in one of two ways, either thick for use in center portions of covers, or thin for use at edges.

(5) *Painting*.—(a) *Colors of nets*.

1. Garnishing for nets must be colored to suit the locality where the net is used. In a stable situation, nets may be furnished to the using units already garnished and colored to fit the particular sites. In mobile situations, garnishing or garnished nets may be furnished in a neutral color, but must be finally colored on the site. In any case, coloring must be checked by air observation to prove its effectiveness. Nets in one solid color throughout generally give as good results as nets with mottled patterns of several colors and are easier to prepare. Garnishing may be colored either by paint or dye. Paint is the more satisfactory material as most dyes fade rapidly. A casein-bound cold-water paint furnished in paste form is the standard material. It is furnished in a variety of colors, including the following:

Burnt umber.

Burnt sienna.
 Yellow ochre.
 Green.
 Golden yellow.
 Ultramarine blue.
 Black.
 White.
 Red.

2. To match a particular piece of terrain, any two or more of these colors can be mixed together to form a new color. The proportions of basic colors to be used must be determined by trial and error for any given locality. Some sample mixtures designed to blend with summer foliage are—

	<i>Percent</i>
(a) Green	75
Golden yellow	10
Burnt sienna	15
(b) Green	60
Golden yellow	15
Burnt umber	15
Red	10
(c) Green	85
Burnt umber	15

(b) *Methods of painting.*

1. Paint may be applied by means of a paint brush, which requires excessive labor, or by means of a spray gun, which is especially useful for correcting colors in the field. Dipping in a vat of paint is the quickest method but requires much more paint and thereby increases the weight of the finished product materially.
2. Garnishing material can be painted before weaving, while in the form of large pieces (bolts or rolls) or strips ready for use. Painting before weaving is economical of paint but makes the material stiff and hence slightly harder to weave. Large pieces are easier to paint than strips, but when strips are cut therefrom their edges are unpainted

which appreciably changes the color of a garnished net. This is unimportant where final matching of colors is done in the field. The material may also be painted after it is woven into the net. This method is particularly useful when the garnished nets are painted by dipping. Both upper and under sides of the net must be painted.

(6) *Construction of embrasures.*—(a) Embrasures must be big enough to permit the guns to shoot through required angles of fire without hitting the inflammable material. The embrasure must be watched during the first two or three shots while the spade is digging in. Sometimes the gun works back 2 or 3 feet.

(b) There are three main types of embrasures; the split type which is the most common, the rolling embrasure, and the counterweighted embrasure.

(c) Often, when guns are placed behind a hedge or brush, the cut in the brush for each gun is visible unless hidden. Hide the embrasure cut by making a brush *cheval-de-frise*, which can be removed for firing and then be replaced. It may also be hidden by a counterweighted embrasure constructed to look like the brush that was cut. (See figs. 9, 10, 11, and 16.)

(7) *Blast marks.*—(a) Blast marks show as white blurs shaped somewhat like a tennis racket in front of each piece.

(b) Blast marks are bigger and whiter the nearer the muzzle is to the ground. When firing up a slope, they will be large; down a slope, very small. They do not exist when firing over a used road, gravel, railroad, or water.

(c) Blast marks may be hidden by covering them with branches held in place by driving a few 12- or 18-inch stakes at irregular intervals in the blast mark. If necessary, wire is strung from stake to stake and branches are thrown into the entanglement. Brush should be renewed every 2 or 3 days because it wears away. The brush pattern should not cover the blast mark exactly. The pattern must be broken up so it will lose its original shape; otherwise, instead of four white blast marks there will be four black blast marks and one is about as undesirable as the other. In bare fields, blast marks may be hidden by plowing or spading the mark as fast as it is beaten down.

(d) For high-angle guns, a low, removable apron of camouflage material can be erected and left in front of the gun. For flat trajectory weapons, if the apron is not removed while the gun is being fired, the first shots will burn it up or blow it away.

(8) *Camouflaging trucks.*—(a) Trucks should use their mobility to get under natural cover wherever possible. They should always park in scattered, irregular formations. They are best concealed under heavy natural cover, as in dense woods. In partly open country they should be run into thin woods or a clump of trees or brush and camouflaged by use of natural material or fishnet drape garnished with natural or artificial material.

Little natural material is required to conceal effectively a vehicle parked in the woods either in summer or winter from an aerial observer or aerial photograph. When natural material is used, the brush is placed over the shiny parts of the vehicle (smearing with mud is also very effective), and sufficient brush is leaned against it in an irregular manner to break up its shape. Examples of camouflage of vehicles under conditions described above, which have proved effective by tests, are shown in figure 5.

(b) In terrain where there is plenty of low-growing brush available but no trees high enough to run vehicles under, detection from the air may be avoided by using garnished fishnet drapes, scattering the vehicles, and making the maximum use of the available bushes to blend with the drapes.

(c) In open terrain where little or no natural growth exists with which to supplement artificial camouflage, it is impossible to conceal trucks. Although vehicles covered by fishnet drapes garnished with artificial cover will be discovered readily because of shadows and small differences in contrast, the drapes are useful in preventing the enemy intelligence agency from determining the identity of the objects.

(d) When used as a drape, the fishnet must be propped up off the vehicle by brush or poles so that the shape of the object will not show through. The edges of the net should be held away from the vehicle by being pegged to the ground or tied to bushes or trees.

(e) Tracks made by even a single vehicle across country may disclose its presence to the air observer or photograph. Discovery may be avoided by carrying the tracks past the parking place instead of allowing them to end there.

(f) Vehicles should never be parked in regular formation but should be scattered in irregular arrangement.

(g) Trucks should be painted in a flat neutral color, as olive drab. Truck covers should be dark in color rather than light. When not in motion, all shiny parts such as headlights and windshields should be covered or obscured as by mud.

(h) After camouflaging trucks, care should be taken not to make unconcealed paths leading to the place where they are located.

(9) *Camouflage for other installations.*—Detailed descriptions of methods for camouflaging bivouacs, observation posts, roads, trails, dumps, and buildings, are given in FM 5-20.

(10) *Snow camouflage.*—(a) The problem of camouflage is much more difficult in snow than under other conditions. Trails and roads become tracked with mud and melt out early, leaving a dark line. Snow falls through camouflage material and the holes show as dark spots. It melts on the warm roofs of dugouts and similar installations, causing them to be visible to air observers and in aerial photographs.

(b) The following precautions should be observed:

1. When snow first falls, activity should be kept at a minimum.
2. Trails, dugout roofs, etc., should be covered with fresh snow and the covering removed as required. Camouflage should be covered with something to hold snow and a layer of snow scattered thereon. It is not necessary to cover the entire surface. The form of the object should be broken up.
3. White cloth in patches should be used to cover camouflage. White cloth in quantities necessary to cover most installations will probably be furnished only for areas where snow remains on the ground for long periods of time.

c. *An estimate of labor involved in camouflage and fortifying a battery position.*—The values in the table below are based on the following assumptions: Soil, medium; weather,

clear and cool; enemy activity, none to disturb the work; training of troops, average; material, standard from supply establishments available at the site for all work; equipment, troops doing the work have all necessary hand tools.

Construction	Man-hours	
	Per gun	Total
Emplacements:		
Excavation of emplacement proper, 1½ feet deep, about 120 cubic feet.....	8	32
Filling and placing about 450 sandbags as inside revetment of parapet.....	24	96
Digging cannoneer trenches.....	9	36
Placing firing platform.....	3	12
Placing trail support.....	2	8
Preparing three ammunition storage spaces at emplacement, probably in the parapet.....	1	4
Camouflaging emplacements, wiring in, etc. (to be done before emplacement is begun).....	8	32
Total.....	55	220
Ammunition shelters:		
Excavating niches in parapet.....		24
Placing shelters.....		6
Backfilling.....		2
Total.....		32
		252

d. Equipment.—(1) Camouflage equipment found by experience to be required for camouflaging the firing position of a field artillery battery is provided for in Tables of Basic Allowances as follows:

Items	Light and medium artillery (except pack)	155-mm gun	240-mm and 8-inch howitzer
Brushes, paint.....	6	6	12
Burlap, yards, 40 inches wide (for garlands and garnishing).....	200	200	600
Clamps, wire, comealongs.....	2	2	8
Cutters, wire.....	4	4	6
Mauls, wooden.....	2	2	4
Fishnets, 36 by 44 inches.....	4	10	16
Paint, gallons.....	17	32	50
Pliers, side cutting.....	4	4	6
Stakes, 4 inches by 6 inches by 8 feet.....	100	100	400
Wire, rolls, No. 10.....	4	4	8
Wire, rolls, No. 16.....	1	1	8

(2) About 10 pounds of staples, 1½-inch, and some 10d and 20d nails are required in addition to the above items.

(3) The above items do not include material for camouflaging trucks, tractors, ammunition dumps, or other installations. Materials for such purposes are provided as required.

e. Summary of general rules for camouflage procedure.—(1) Plan organization of the position as a whole, not piecemeal.

(2) Make a sketch of the position as it would appear on an air photograph and keep position appearing that way.

(3) Prepare a simple circulation system and a circulation chart for occupation of position and for supply. Continue all new roads and paths beyond the camouflaged installations.

(4) Block off paths not to be used and wire the edges of those included in the circulation plan.

(5) Conceal new paths by trellis work in splotches, never with parallel edges, over the path.

(6) Use natural materials in preference to artificial ones, and place them in their natural positions. When nets and other artificial material are used, follow procedure described in *b* above.

(7) Work on camouflage and on its maintenance from the inside.

(8) Dig in when time is available. When guns are dug in, have nets not more than 4 feet above the ground and keep them at least $2\frac{1}{2}$ feet above objects under them. Put up camouflage over guns before the digging of gun pits begins. Wire off gun pits to prevent objects being placed under the thinned edges of camouflage nets.

(9) Erect screens in front if guns are not defiladed.

(10) Cover embrasures with screens when guns are not firing.

(11) Provide for concealment of blast marks. (See *b* (7) above.)

(12) Dispose ammunition for concealment near a path, hedge, or trench; never pile it higher than 2 feet; cover with natural material.

(13) Camouflage vehicles as described in *b* (8) above.

(14) Hide all auxiliary parts (observation post, command post, kitchen, vehicles) of the battery. They ordinarily lead to discovery of the battery position.

(15) Allow no cutting of sod or natural growth in vicinity of the position.

(16) Camouflage all spoil and litter.

(17) Keep surplus personnel away from guns.

(18) Secure aerial photographs of the position and study them for defects or changes in appearance.

(19) Once complete, maintain camouflage and watch camouflage discipline.

■ 28. FIELD FORTIFICATIONS.—*a. General.*—The tactical considerations concerning field fortifications as they apply to field artillery are discussed in FM 6-20. Detailed technical information concerning them is found in FM 5-15. Some of the most essential reference matter of particular interest to the field artillery is summarized here. For the construction of works of the hasty type, it may be assumed that only those tools which are carried in the field as part of the battery

equipment are available. On the other hand, since deliberate fortifications are built in standard patterns, of standard materials, and with less necessity for speed, additional tools, both as to kind and quantity, are necessary. They are requisitioned from engineer supply establishments. The use of standard types of field fortifications facilitates the planning of the works, takes advantage of the training of personnel, and facilitates the requisitioning and supply of the necessary materials.

b. Emplacements.—The depth to which a piece may be sunk depends on the nature of the ground, lowest angle of elevation which will be required of the piece, and length of the axis of the bore above the bottom of the wheels when the tube is level. Figures 4, 14, and 15 show several types of emplacements for field artillery. Figure 16 shows the general nature of emplacements suitable for certain special situations.

c. Trenches for cannoners.—The dimensions for these trenches can only be approximated; each case must be considered separately. Too many features enter into the consideration to permit of any standard. In general, trenches are as narrow as will permit a man to enter and each trench is long enough to contain half the section. A trench 2 feet 6 inches wide and 12 feet long fulfills these requirements for the 75-mm gun or the 155-mm howitzer. A slightly longer trench is required for the 155-mm gun or 240-mm howitzer. Details of trenches are shown in figures 14 and 15. The figures only show plans that will work under certain conditions. The earth excavated from the trench is thrown up to form a parapet around the trench. This decreases the amount of excavation but does not give as good protection as may be obtained if the trench is made deep enough to give the desired cover without a parapet. The capacity of the soil to stand up in the trench walls and the facilities for drainage frequently determine which method may be adopted. Should it be found necessary, the trench may be braced as shown in figure 17.

d. Platforms.—(1) An improvised log platform may be quickly constructed by burying three or four sills in the ground parallel to the direction of fire and laying upon them at right angles a row of logs. They can be held in place by

wiring or spiking the top layer to the sills or by covering the entire platform with about 6 inches of earth (fig. 18). In any case, the completed platform should not be higher than the ground on either side of it. If broken stone is available, a trench about 3 feet long, 1 foot deep, and 1 foot wide can be dug under each wheel and the trench filled with stone. In deliberate positions, wooden platforms are constructed and may be made of standard dimensioned timber obtained from the supply service. Because of weight, it is not feasible to have the platforms made up in the rear and brought forward assembled. Concrete platforms are not suitable for pieces not specially designed to be fired from concrete bases, since they are not sufficiently resilient to take up the shock of the recoil without injury to the piece. The wooden platforms are simple in design, made of standard size lumber, and sufficiently strong to support the weight. It is desirable to make them large enough to provide space for the men loading the piece.

(2) The 75-mm gun platform shown in figure 19 consists of sills, posts, and deck. It is given as a guide for construction of similar platforms to accommodate the various types and models of field artillery, it being necessary only to vary the size of the platform for the particular weapon. If the platform is constructed for a gun with a box trail, a disk, 4 feet 10 inches in diameter, made of 3- by 8-inch wood fastened to the platform, will facilitate laying the piece for deflection.

Bill of material

Description	Size	Number required
Posts.....	4 inches by 4 inches by 3 feet.....	8
Sills.....	3 inches by 8 inches by 6 feet 8 inches.....	54
Decking.....	3 inches by 8 inches by 7 feet.....	10

(3) A platform may seldom be required for the 155-mm gun and the wheel supports or separate large timber blocks may be all that are necessary except under the most unfavorable soil conditions. Under certain conditions, large timber blocks

placed under the wheels suffice. By the use of these, less digging is involved both for the recoil pit and in the use of jacks than when the piece rests on the wheels or track shows alone. Moreover, the gun can be placed in position in slightly less time. The specially prepared wheel support is made of two runners wide enough to give full bearing to the wheels, strong enough to support the load, and braced to prevent twisting or movement out of line (fig. 20).

Bill of material

Description	Size	Number required
Crosspieces.....	3 inches by 8 inches by 8 feet 7 inches.....	5
Runners.....	14 inches by 14 inches by 14 feet.....	2
Bolts.....	$\frac{1}{2}$ inch by 15 inches.....	12

e. Trail supports.—Details of one type of trail support for a light field gun are shown in figure 21. A similar trail support may be used for the 155-mm howitzer; 12- by 12-inch timbers are used and preferably braced to other timbers set in a trench dug 2 or 3 feet in rear. The timber is cut on a 12-foot arc and a wooden block, 8 by 16 inches and 2 feet 10 inches long, is fastened to the spade. When additional supports are placed in rear of the trail circle, the space between the two is filled with broken stone, brick, or similar material. When fascines are used, one laid in front and one in rear of the spade will prevent the trail from burying itself. The 155-mm gun generally requires no additional support for the trail beyond that afforded by the ground itself. In wet or soft ground, or for continuous firing from one emplacement, additional support may be required. This can easily be provided by placing a large log or timber under the shoe normal to the trail. The timber should preferably be about 12 inches square in section and 12 feet long, extending 6 feet on each side of the center of the trail, and placed flush with the ground surface. If smaller timbers or logs are to be used, they are placed one on top of the other in a trench of the proper depth.

f. Command posts.—Details of various types of command posts are shown in figures 22 and 23. Such trenches are not of sufficient size for continued occupancy, and in order to facilitate movement at the command post, splinterproof compartments are constructed in the side of the trench. To accommodate the personnel, three such compartments are required (fig. 24). Details of the construction of standard type of bombproof command posts are found in FM 5-15.

g. Observation posts.—When an observation post is to be constructed in a trench located on a forward slope, it may be constructed as shown in figure 25. The same general method may be employed when the trench is on level ground. Special precautions must be taken to camouflage the cover and the opening.

h. Personnel shelters.—A hasty splinterproof shelter for six men lying down may be constructed as indicated in figure 26, and is particularly desirable for personnel in positions well forward. The interior dimensions of such a shelter are 14 by 6 by 4 feet. The roof should not project above the parapet of the trench. It is built of two layers of logs at least 6 inches in diameter, with 1 foot of tamped earth between them. The lower layer is placed parallel to the smaller dimension of the shelter. The upper layer of logs gives protection from stray shots of light percussion shell. This layer extends at least 3 feet beyond the walls of the shelter and the earth slope is extended sufficiently to protect the sides of the shelter. It is advisable to wire the upper layer of logs together. A layer of tar paper or corrugated iron placed over the top layer of logs makes the shelter waterproof. Until the position becomes stabilized, the battery personnel not on duty are located in naturally concealed or covered positions from 200 to 1,000 yards in rear of the pieces, the distance depending upon the accessibility of a good position and whether the battery is of light, medium, or heavy artillery. When little or no natural concealment or cover can be obtained, trenches are dug and light temporary shelters are constructed. Details for the construction of shellproof shelters are given in FM 5-15.

i. Ammunition shelters.—(1) The essential requirement of an ammunition shelter is that it be waterproof. Cover

to give protection from shellfire is not essential, although concealment is desirable always. It is also desirable that ammunition be stored below the level of surrounding ground, so that if a direct hit is obtained, the destructive effect of the explosion will be minimized. In cases where the ground water limits the depth of excavation, irregularities in the surface of the ground are utilized to obtain a certain amount of natural cover. In hasty position, time seldom permits the construction of shelters for ammunition. The essential requirements are to keep the ammunition dry and well concealed. It is protected as described in FM 6-40.

(2) In stabilizing situations, ammunition shelters do not require elaborate construction and those shown in figures 27 and 28 illustrate types that may be used. The shelters are located in rear of the piece or at some favorable point on the flank. Shelter for some ammunition is constructed at the emplacement. Additional shelters are constructed farther in rear for a reserve supply. Shell, powder charges, and fuzes always are stored in separate places. For separate-loading ammunition, the shelter for shell preferably is located to the left of the emplacement. There are several types.

(a) A corrugated steel arch shelter erected in the side of a trench is illustrated in figure 27. This shelter holds 50 rounds of ammunition or 8 boxes of fuzes.

(b) Elephant steel shelters preferably are used for storing 155-mm or larger shell. These are waterproof, easy to erect, and the materials for them are usually available. They are built to any size by increasing the number of sections in the shelter. The height is sufficient to enable a man to move around freely inside the shelter. The construction of an elephant steel shelter for 155-mm ammunition is illustrated in figure 28.

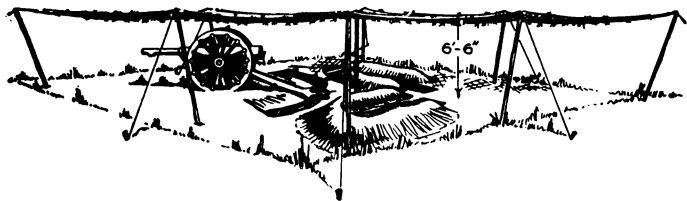
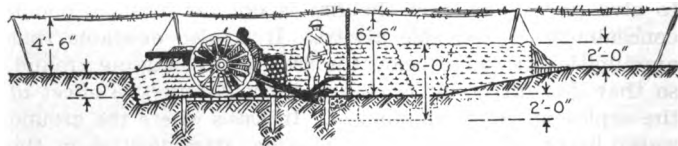
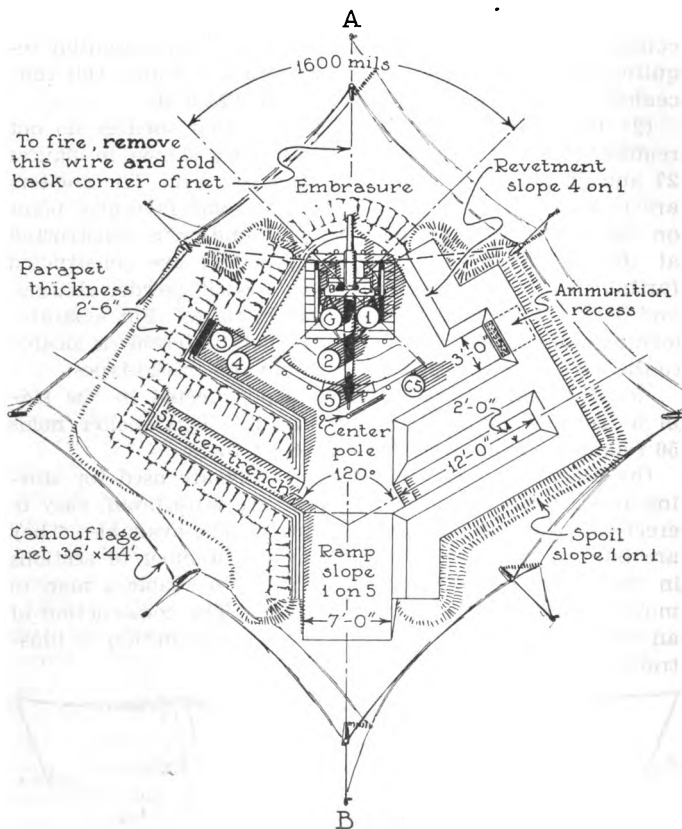


FIGURE 3.—Initial steps in camouflage and construction.

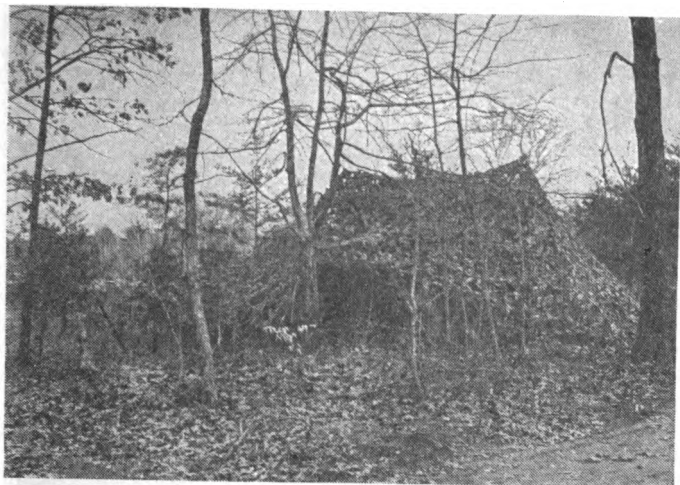


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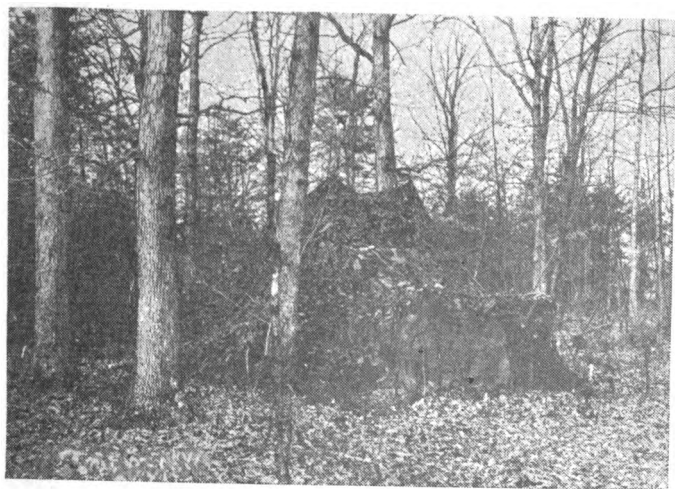


②

FIGURE 4.—One type of completed emplacement for one light gun.



①



②

FIGURE 5.—Camouflage of trucks in wooded area, using natural material or fishnet drape.



(3)



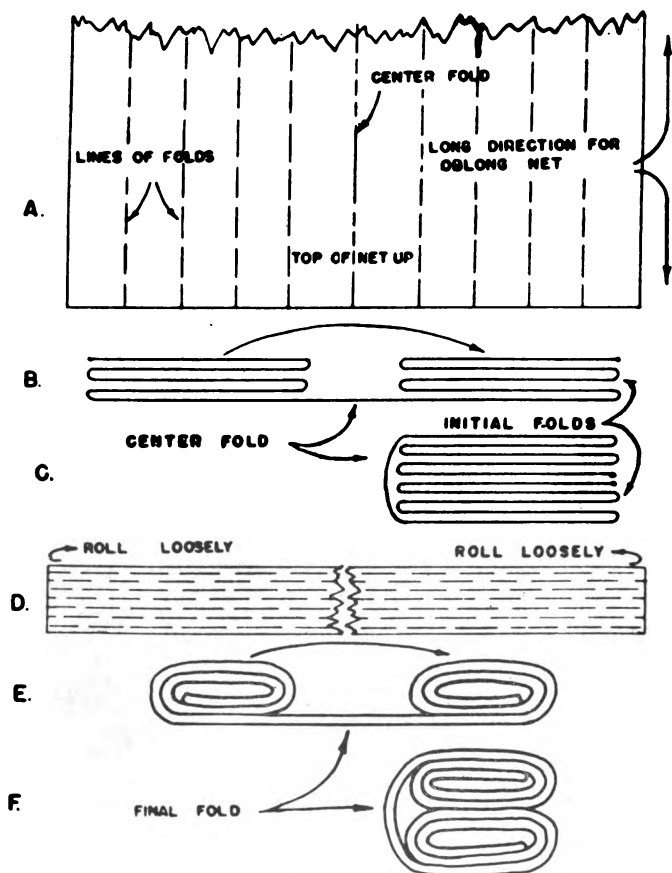
(4)

FIGURE 5.—Camouflage of trucks in wooded area, using natural material or fishnet drape—Continued.



⑤

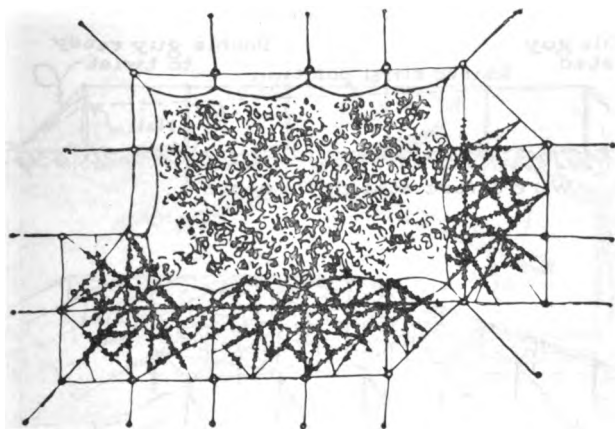
FIGURE 5.—Camouflage of trucks in wooded area, using natural material or fishnet drape—Continued.



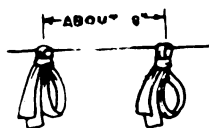
PROCEDURE

1. SPREAD FLAT, (A.) AND FOLD TOWARDS CENTER, (B AND C.) TO FORM LONG FOLDED STRIP (D.)
2. ROLL LOOSELY FROM BOTH ENDS, (E.) AND FOLD ROLLS TOGETHER. (F.)

FIGURE 6.—Folding of fishnets.

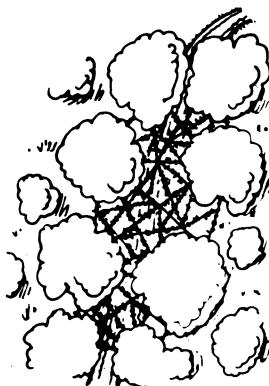


EXTENDING IRREGULARITIES WITH GARLANDS



DETAIL OF GARLANDS

USE FRICTION TAPE OR KINK
WIRE TO PREVENT SLIPPING



GARLANDS USED TO THICKEN NATURAL COVER

FIGURE 7.—Garlands.

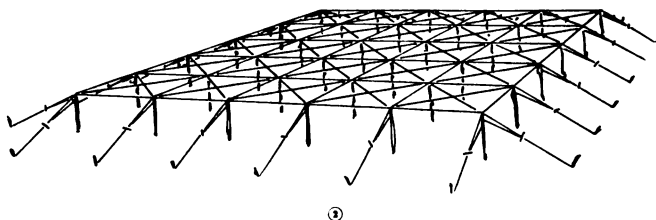
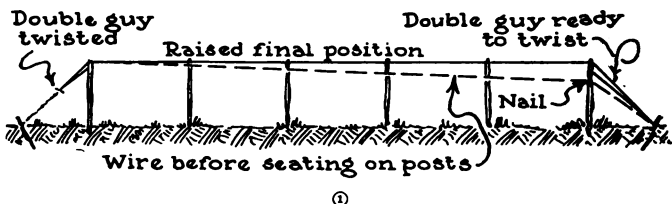
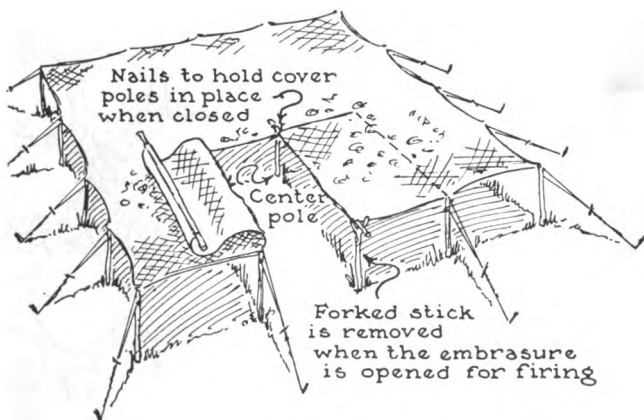
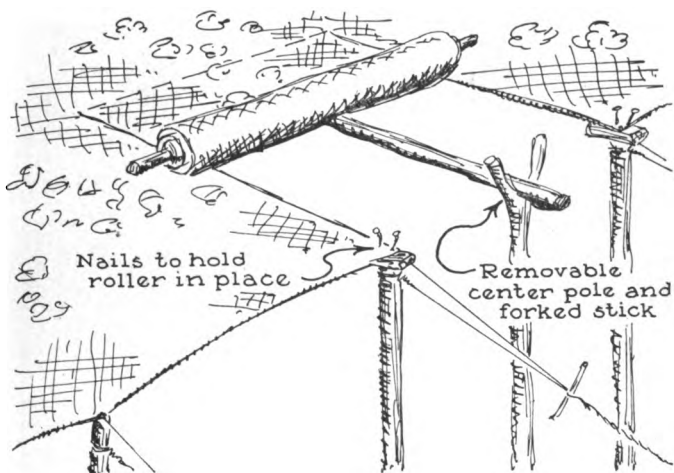


FIGURE 8.—Flat-top wire frame (not lowered).

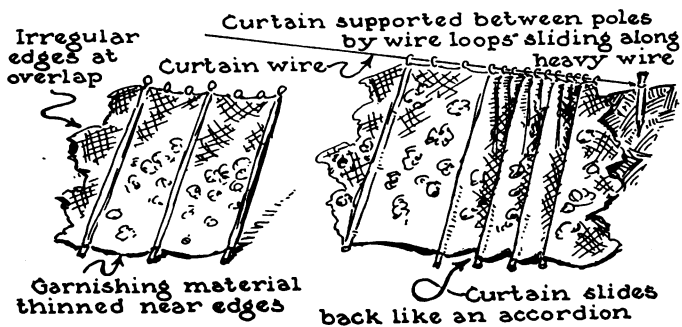


- ③ Most common type of embrasure; each half is thrown back before firing.

FIGURE 9.—Simple embrasures.

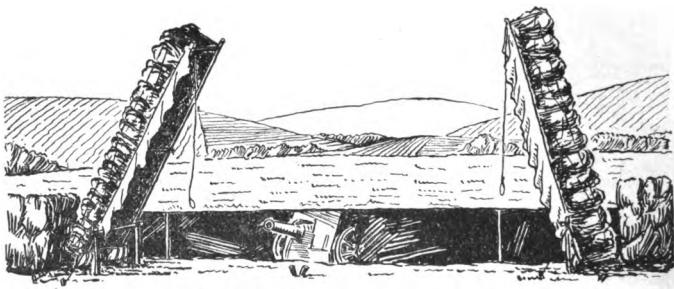


② Embrasure rolled back for firing.

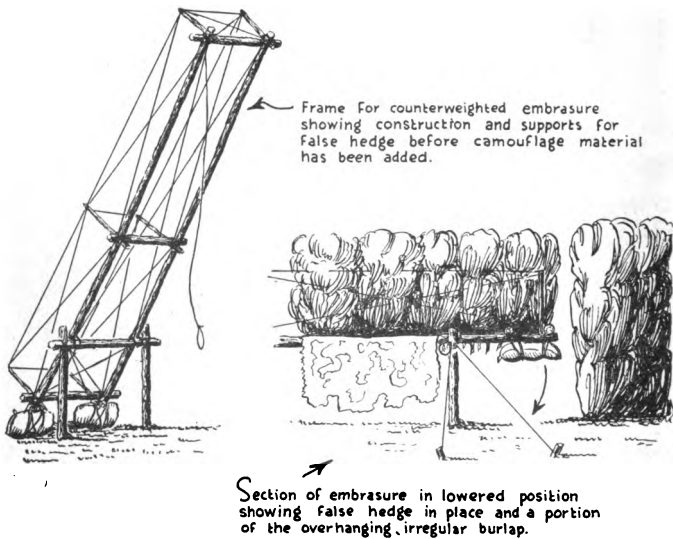


③ Curtain embrasure.

FIGURE 9.—Simple embrasures—Continued.

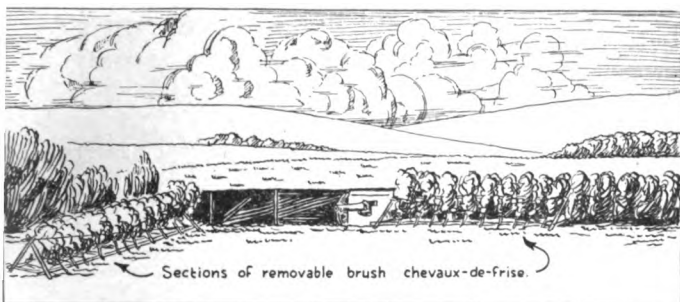


① Perspective.

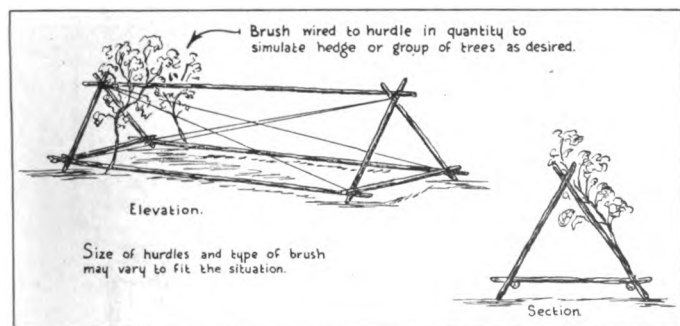


② Details of construction.

FIGURE 10.—Counterweighted embrasure.



① Perspective.



② Details of construction.

FIGURE 11.—Use of brush chevaux-de-frise as an embrasure.

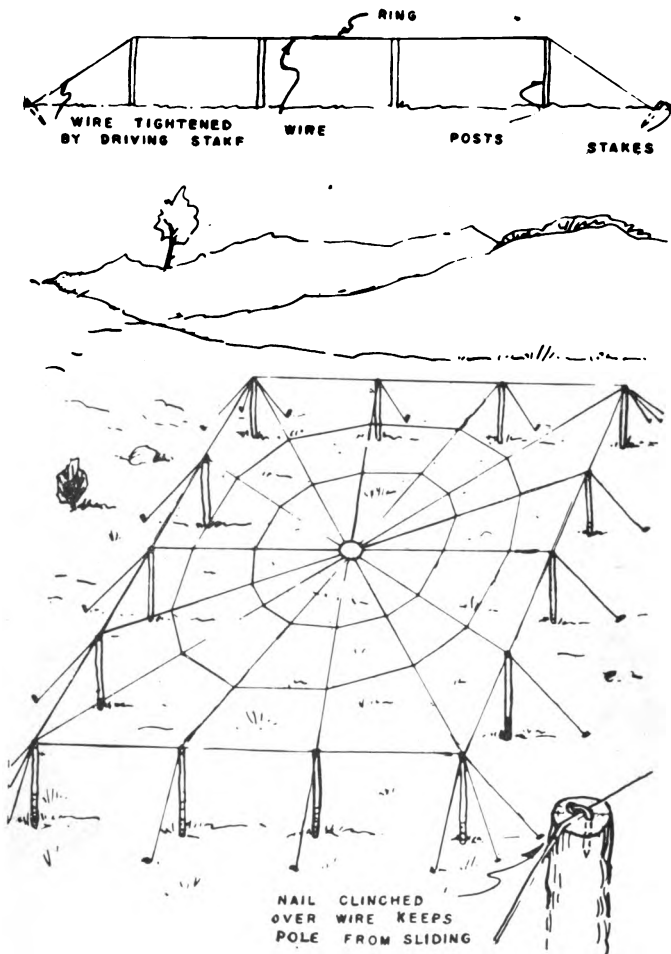
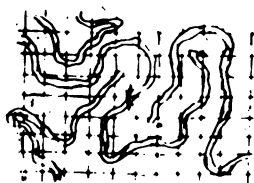


FIGURE 12.—Flat-top wire frame.

GARNISHED FISHNET



SECTION



DETAIL

FIGURE 13.—Garnishing.

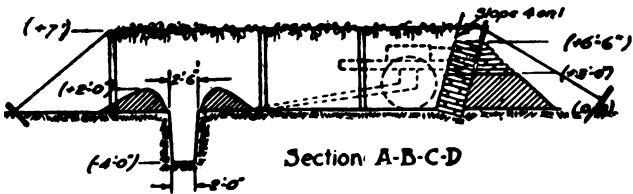
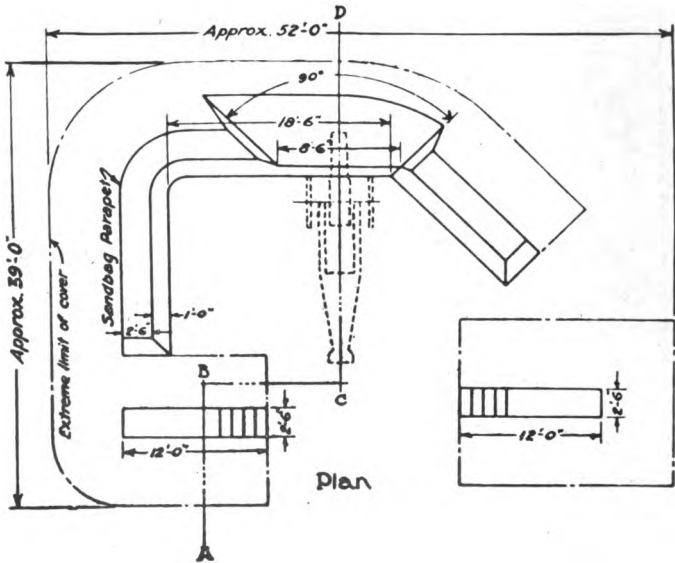


FIGURE 14.—Emplacement for 155-mm howitzer, M1918.

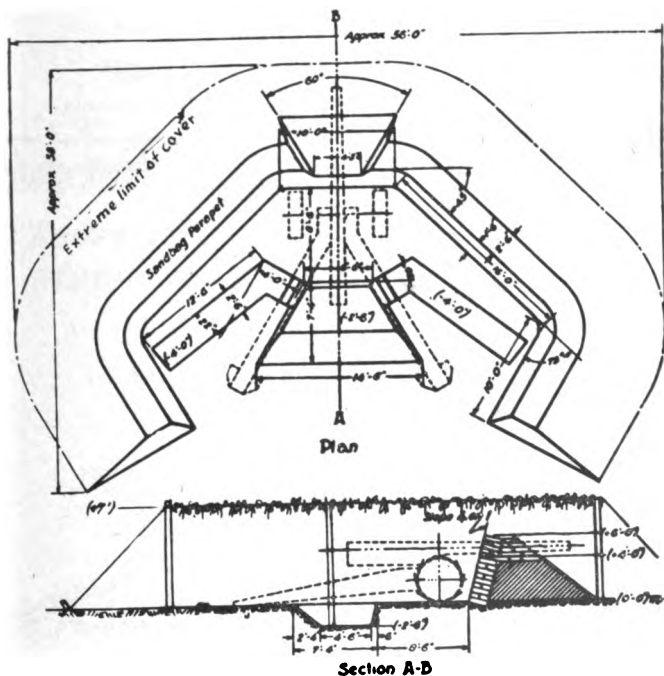
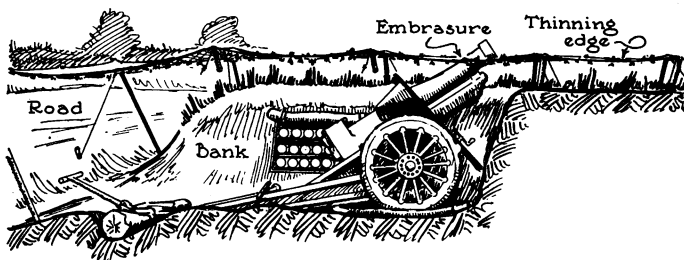


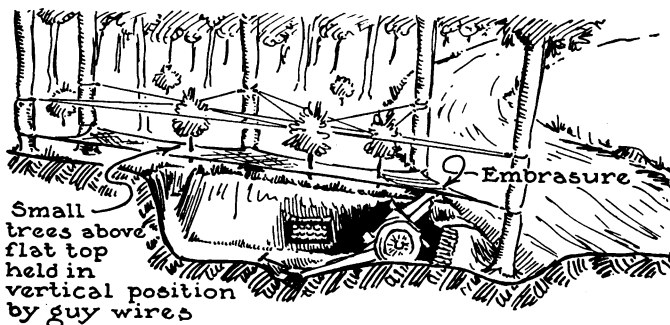
FIGURE 15.—Emplacement for 155-mm gun (GPF).



① A light gun in bank along edge of a road.



② A howitzer in bank along edge of a road.



③ A howitzer in edge of woods along a road.

FIGURE 16.—Details of camouflaged positions.

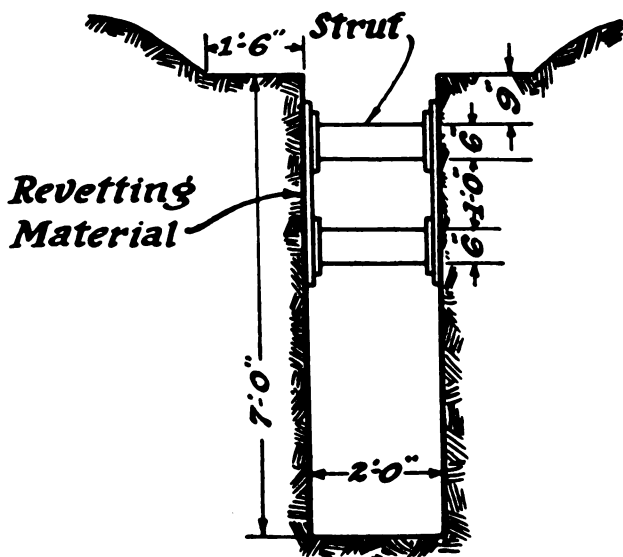
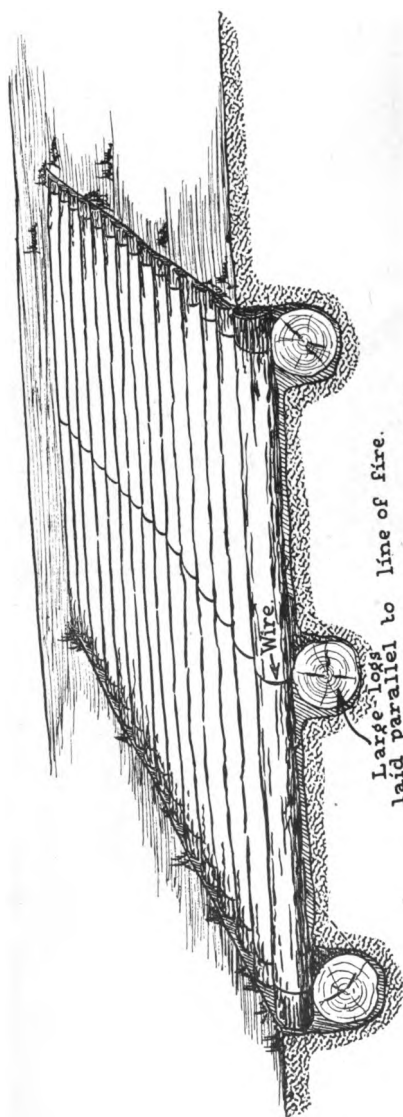


FIGURE 17.—Slit trench to protect against shell fire.



Large logs
laid parallel to line of fire.

Wire.

FIGURE 18.—Improvised log platform.

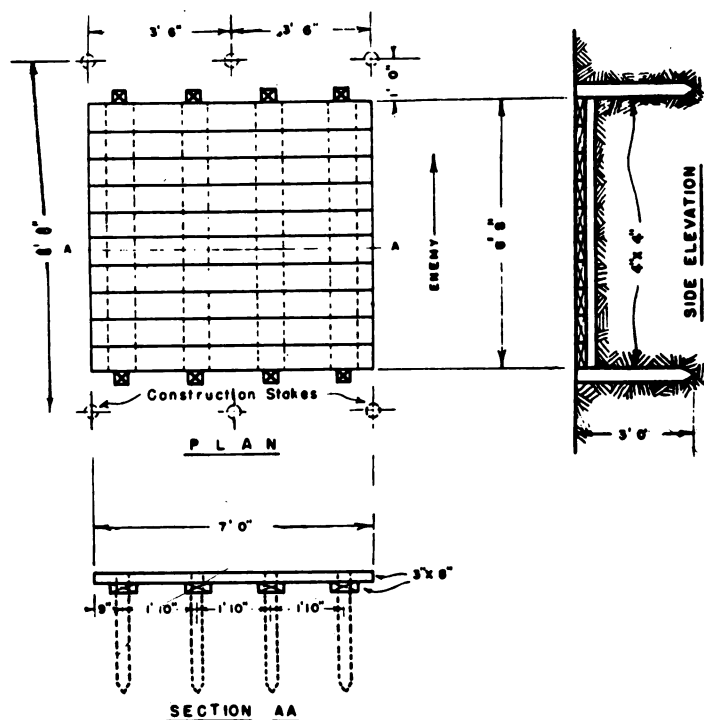


FIGURE 19.—Platform for 75-mm gun, M1897A4.

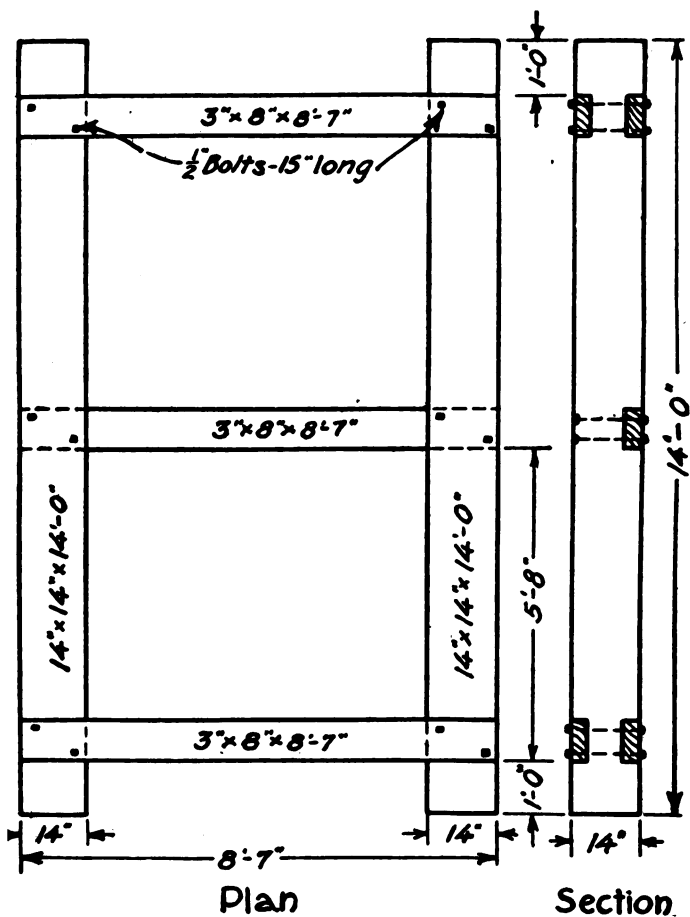


FIGURE 20.—Wheel support for 155-mm gun M1918A1.

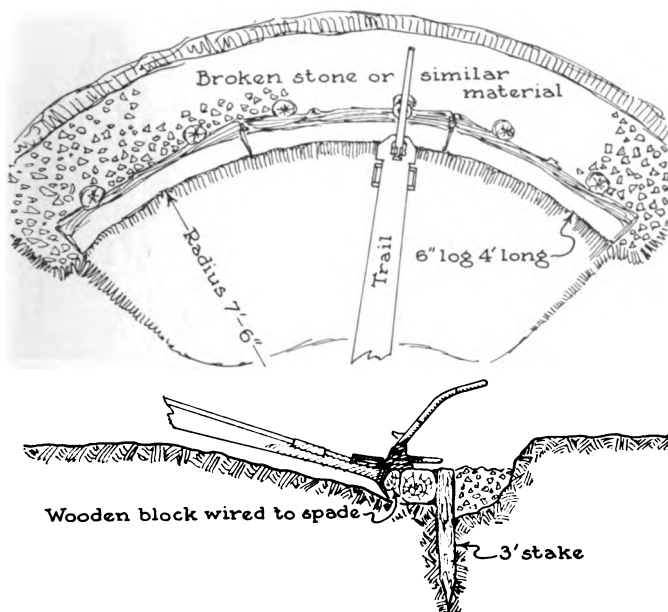


FIGURE 21.—Details of a trail log support for a 75-mm gun, M1897A4.

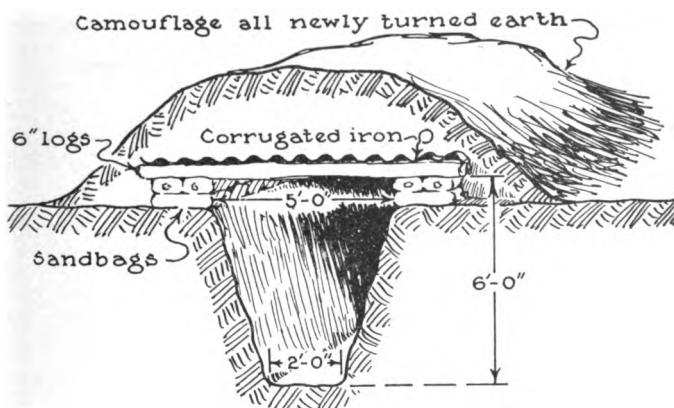


FIGURE 22.—Splinterproof trench for a command post.

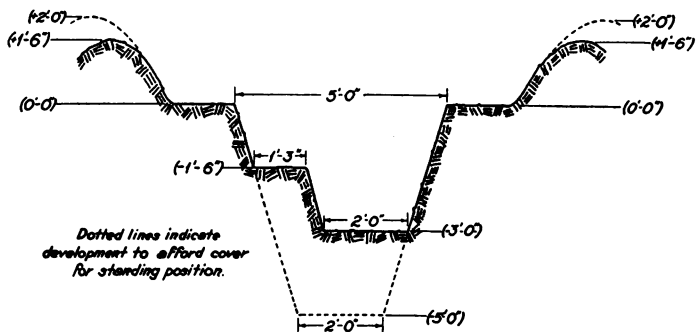


FIGURE 23.—Trench for hasty type command post.

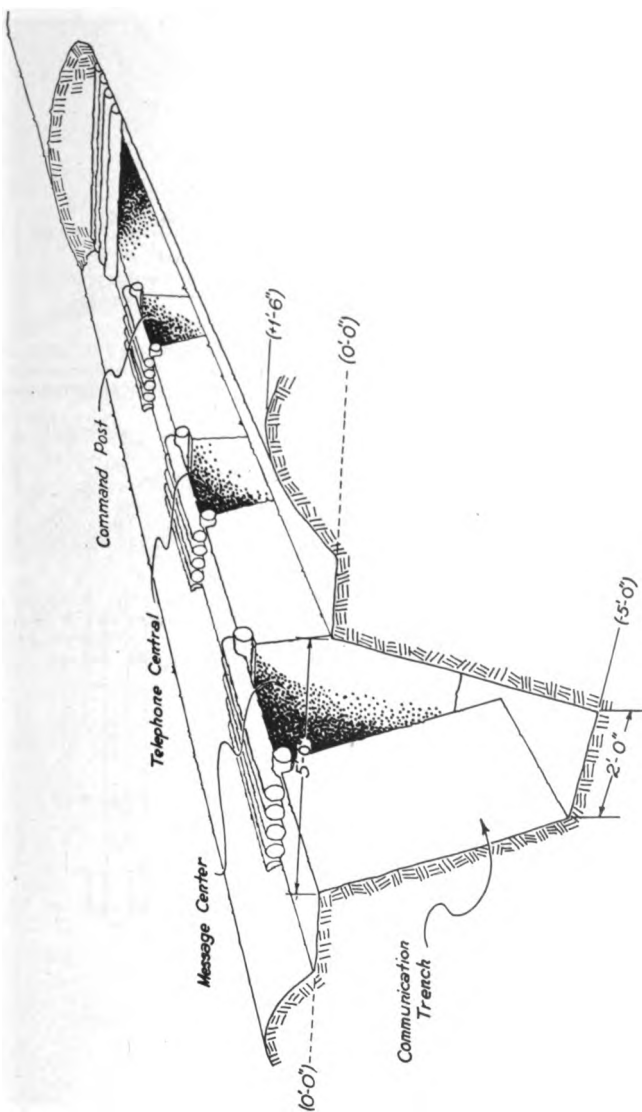


FIGURE 24.—Splinterproof command post trench with compartments.

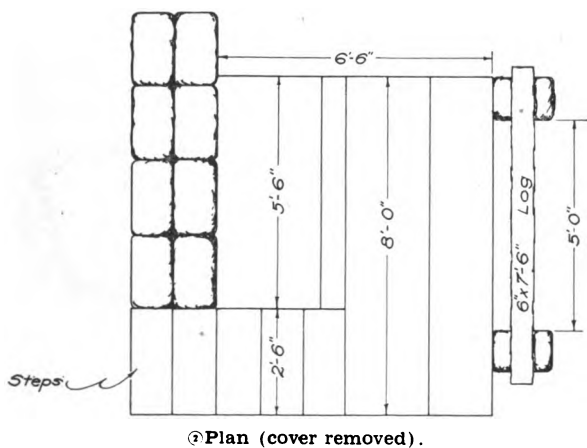
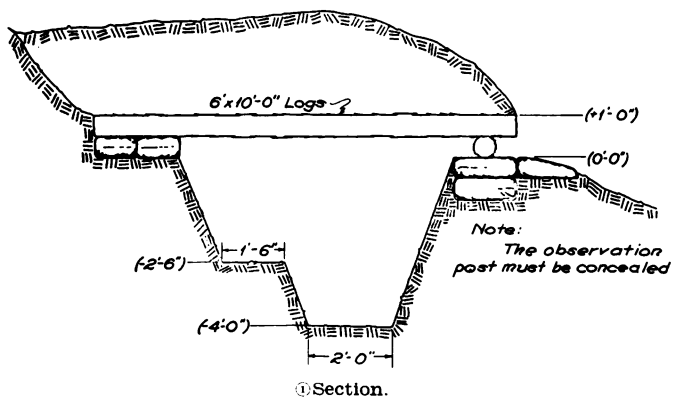


FIGURE 25.—Splinterproof observation post in trench.

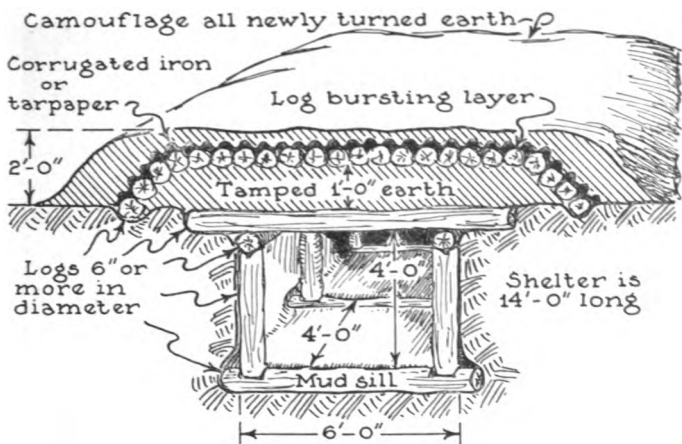
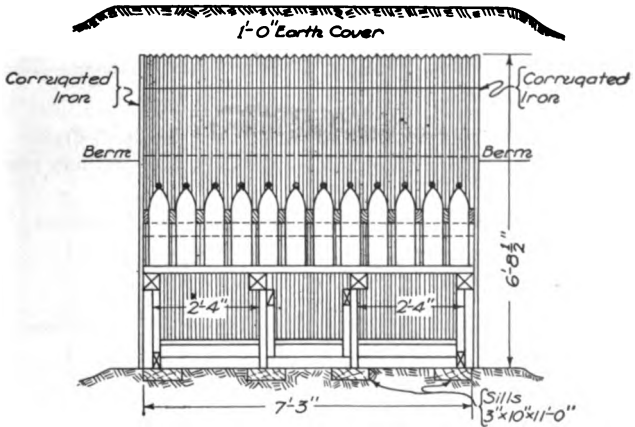
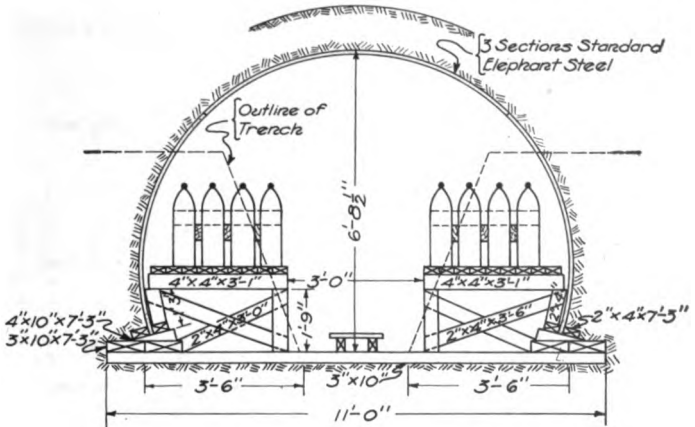


FIGURE 26.—Splinterproof cover for six men lying down.



① Longitudinal section.



② End elevation.

FIGURE 28.—Elephant steel shelter for 155-mm ammunition.

SECTION VII

MOVEMENTS

■ 29. FORMULAS FOR TESTING CAPACITY OF BRIDGES.—These formulas are contained in FM 25-10.

■ 30. WEIGHT DISTRIBUTION OF ARTILLERY LOADS.—Figure 29 shows the weight distribution of several typical artillery loads.

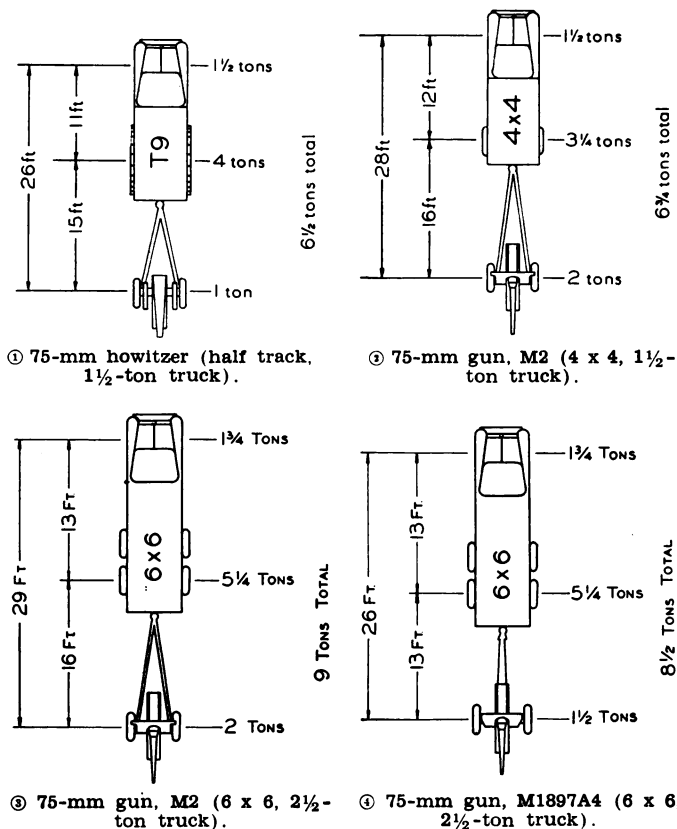
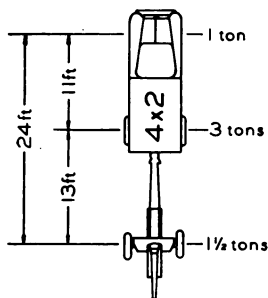
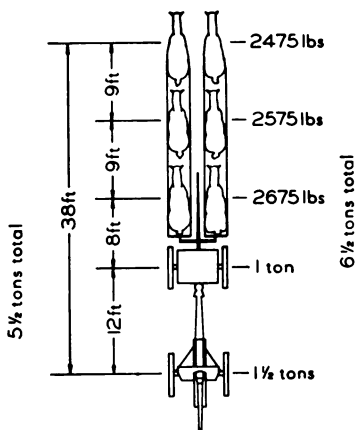


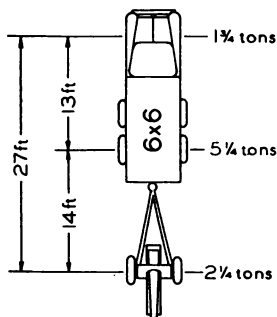
FIGURE 29.—Weight distribution of artillery loads.



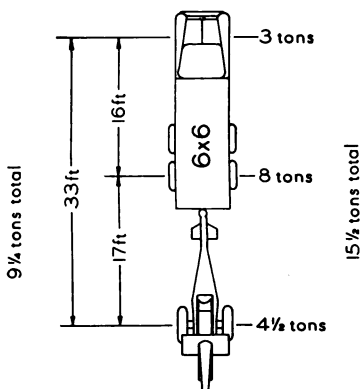
⑤ 75-mm gun, M1897A4 (4 x 2, 1 1/2-ton truck).



⑥ 75-mm gun, M1897 (horse-drawn).

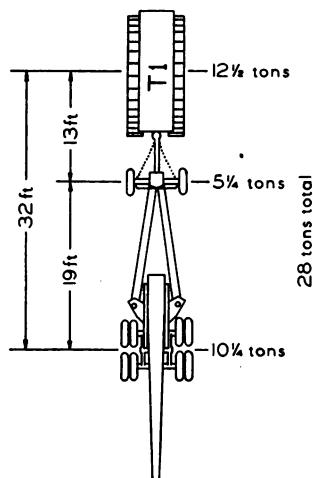


⑦ 105-mm howitzer (6 x 6, 2 1/2-ton truck).

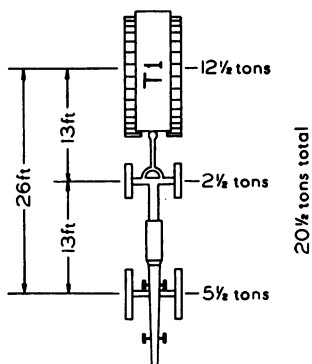


⑧ 155-mm howitzer, M1918A1 (6 x 6, 4-ton truck).

FIGURE 29.—Weight distribution of artillery loads—Continued.



① 155-mm gun, M1 (heavy tractor).



② 240-mm howitzer, M1918 (heavy tractor).

FIGURE 29.—Weight distribution of artillery loads—Continued.

■ 31. AVERAGE RATES AND LENGTHS OF MARCHES OF MOTORIZED UNITS.

Type of transport composing column	On primary roads			On secondary or hilly primary roads			Across country, with traction devices where necessary			Emergency (short distance) (p. p. h.)	Average day's march of a column (7 hours) (miles)
	Day (m. p. h.)	Night		Day (m. p. h.)	Night		Day (m. p. h.)	Night			
		Lights (m. p. h.)	No lights (m. p. h.)		Lights (m. p. h.)	No lights (m. p. h.)		Lights (m. p. h.)	No lights (m. p. h.)		
Passenger vehicles and ½-ton trucks.....	30	30	5-15	25	25	5-15	10	3	3	40	210
Trucks, light, ½- to 2½-ton, with or without towed load.....	23	23	5-15	18	18	5-15	8	3	3	35	160
Trucks, medium, 4-ton, with or without towed load.....	20	20	5-15	15	15	5-15	8	3	3	30	140
Trucks, heavy, 5- to 10-ton..	20	20	5-15	15	15	5-15	8	8	3	25	140
Trucks, heavy, 5- to 10 ton, towing guns.....	15	15	5-15	15	15	5-15	8	8	3	20	100
Tractors, heavy.....	6	6	4	5	5	3	4	3	2	8	40

■ 32. TIME-DISTANCE GRAPH FOR MOTOR MOVEMENTS.—From figure 30 may be determined the distance covered in any given period by the leading vehicle moving at a given rate, or the time required for the leading vehicle to cover a given distance.

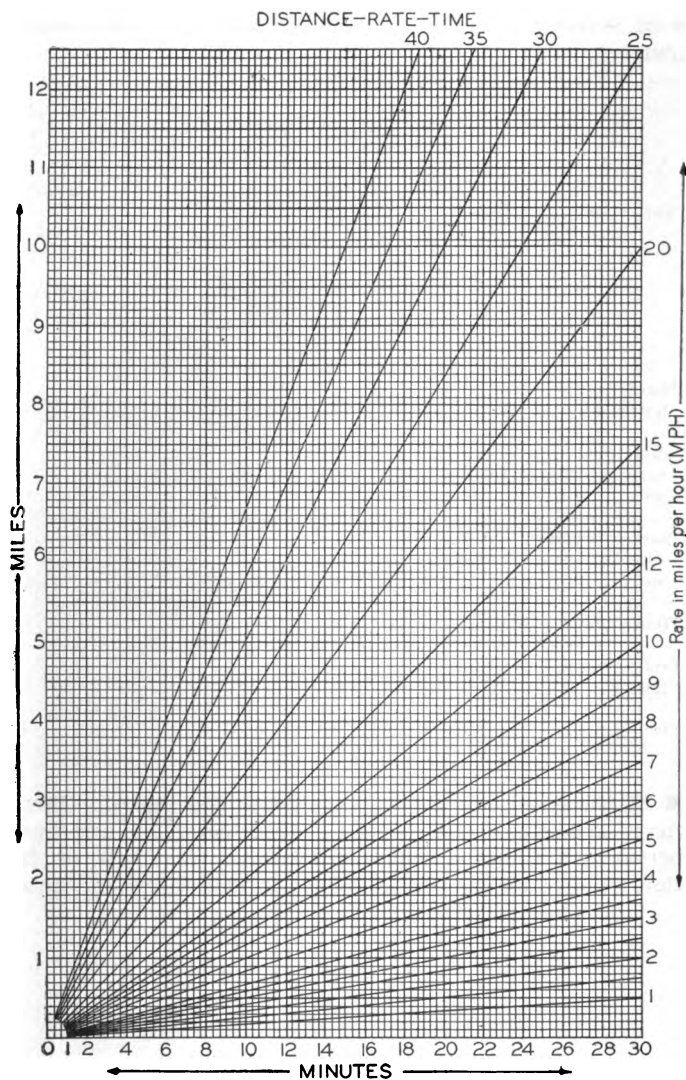


FIGURE 30.—Time-distance graph for motor movements.

■ 33. SPACE ON RAILWAY CARS.—Space requirements as shown below may be used as a basis for computing car requirements for movement by rail. The length of flat cars is assumed to be 40 feet. Automobile cars may be substituted for flat cars.

1 coach:

30 men.

1 modified box car:

36 men.

1 stock car or modified box car:

18 to 22 animals.

$\frac{1}{6}$ flat car:

Caisson.

Howitzer, field 75-mm.

Gun, 75-mm, M1897, all models.

Limber, gun or caisson, 75-mm.

Reel, battery, 4-horse.

Motorcycle with side car.

Trailer, 2-wheel, empty.

$\frac{1}{4}$ flat car:

Howitzer, 105-mm.

Tractor, light.

Trailer, 2-wheel, loaded.

$\frac{1}{3}$ flat car:

Gun, 75-mm, M2.

Wagon, mountain.

$\frac{1}{2}$ flat car:

Ambulance, field, motor.

Car, light, passenger.

Car, medium, passenger.

Gun, 155-mm.

Howitzer, 155-mm.

Tractor, heavy.

Trailer, cargo, 4-wheel.

Truck, cargo, $1\frac{1}{2}$ - to $2\frac{1}{2}$ -ton.

Truck, pick-up, $\frac{1}{2}$ -ton.

Truck, reconnaissance, 8-passenger.

$\frac{2}{3}$ flat car:

Howitzer, 240-mm (for each of four loads).

Truck, 4-ton, cargo.

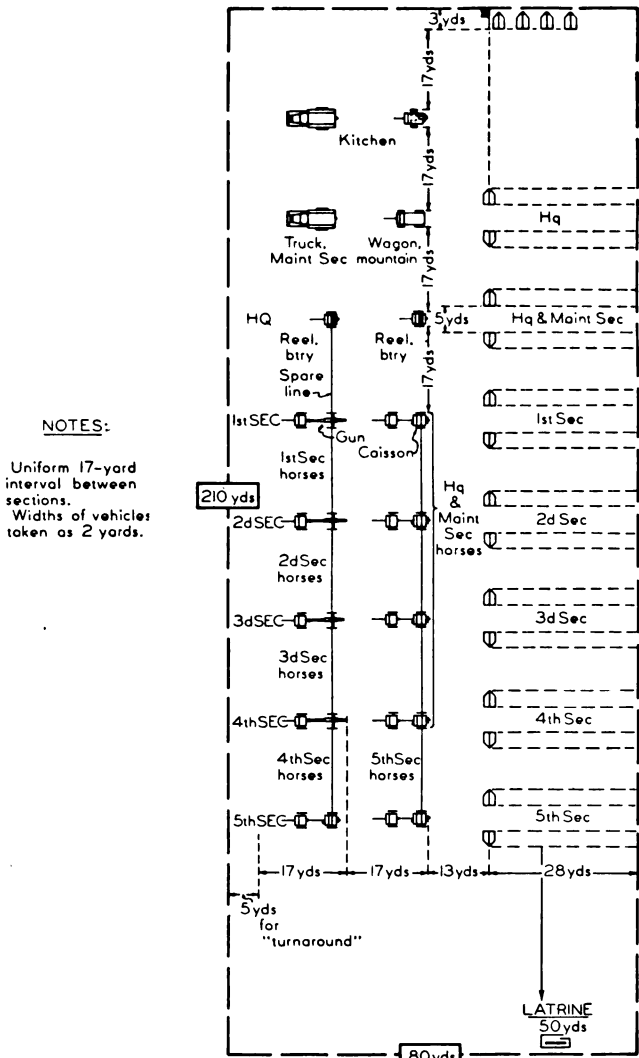
Truck, $7\frac{1}{2}$ -ton, prime mover.

■ 34. **STANDARD TRAINS.**—The composition of standard trains adopted for use within and near the theater of operations may change from time to time. Organizations should prepare loading charts based upon the correct type train, current Tables of Organization, and personnel and equipment available.

SECTION VIII

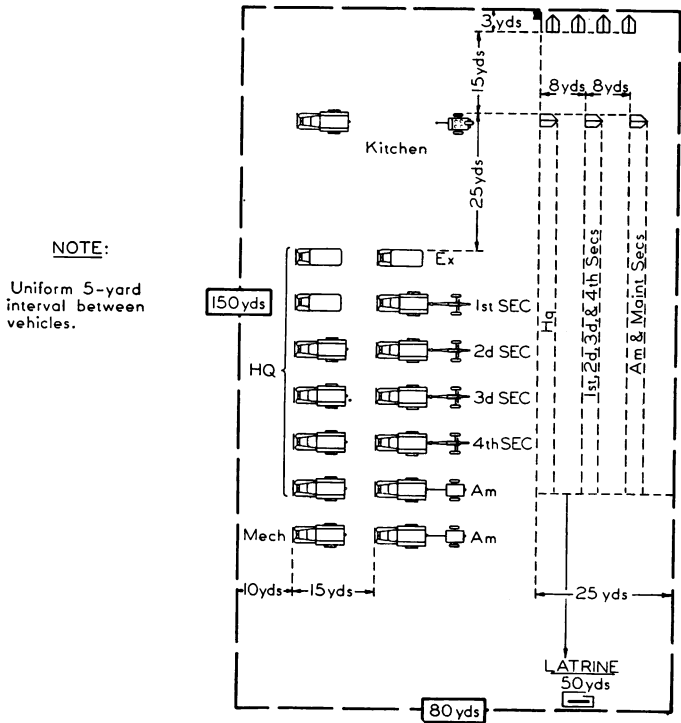
BIVOUACS

■ 35. **FORMAL BIVOUACS.**—Suggested bivouac formations and areas are shown in figures 31, 32, and 33. Because of their conspicuousness from the air and their vulnerability to air attack, these bivouacs are not appropriate in campaign or when simulating campaign conditions.



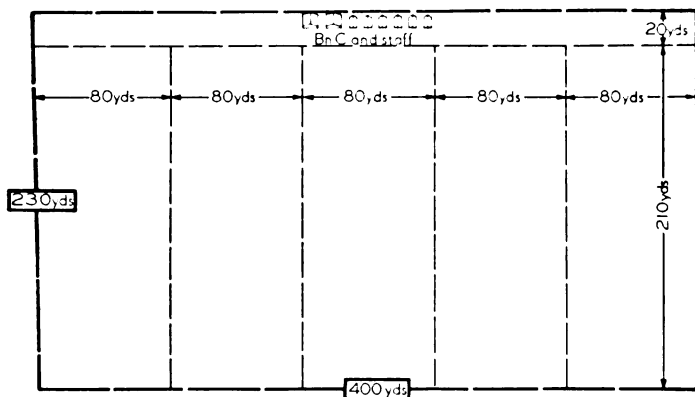
① Horse-drawn (T/O 6-17).

FIGURE 31.—Formal bivouac, 75-mm gun battery.

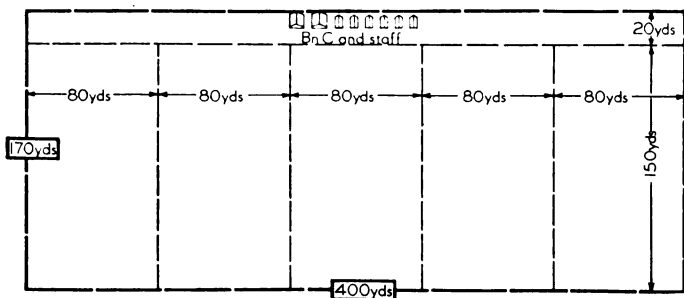


② Truck-drawn (T/O 6-27).

FIGURE 31.—Formal bivouac, 75-mm gun battery—Continued.

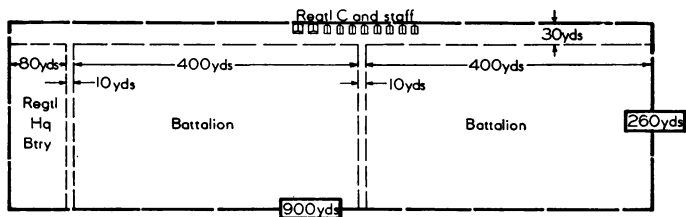


(a) Horse-drawn (T/O 6-15).

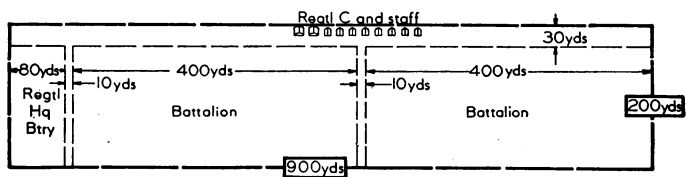


(b) Truck-drawn (T/O 6-25).

FIGURE 32.—Formal bivouac, 75-mm gun battalion.



① Horse-drawn (T/O 6-11).



② Truck-drawn (T/O 6-21).

FIGURE 33.—Formal bivouac, 75-mm gun regiment.



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